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The admirable exhibit which the Province of Ontario has presented at the Pan-American Exposition at Buffalo, which is described on another page, will be of great service to its mining industries. Nothing can draw attention to the mineral resources of the Province better than such an exhibit. Great credit is due to the Mines Department for the care and thoroughness with which the exhibit has been prepared. The extent and variety of the products shown will be a surprise to many people, even in the Province itself, and will give the world generally a better idea of Ontario's present production and future possibilities than it ever had before.

The disposition of the lead smelting case by the Dominion Government ought to satisfy the British Columbia miners and smelters. As shown on another page, authority is given for a bounty on all lead smelted and refined in the Dominion, which is to be $5 per ton the first year, 1902, and is to be diminished gradually to $1 a ton in 1906. It is true that a limitation is put on the amount to be paid, which is not to exceed $100,000 in any one year. It is not likely, however, that more than 20,000 tons of lead will call for the bounty next year, so that this can hardly be called a limitation. With this extra inducement there should be no difficulty in securing the establishment of smelters sufficient in capacity to treat the lead ores of British Columbia.

The question of a tax on nickel ores and matte exported is still undecided. Last month we noted the presentation of memorials to the Dominion Government asking for the disallowance of the Ontario Legislation authorizing the imposition of such a tax. The Dominion Government has not taken any direct action, but has decided to refer the Ontario law to the Supreme Court for its opinion. This presumably will settle the question whether an act of the Ontario Legislature imposing what is nominally a license tax, is open to disallowance by the Dominion. The so-called license—which would be really an export tax—has a strong public opinion against it in the districts which would be most affected by it. It is to be hoped that the narrow policy outlined by a small party in Ontario will not be carried out.

BRITISH COLUMBIA—VANCOUVER ISLAND AND THE COAST MINING DISTRICTS.

Written for the Engineering and Mining Journal by Wm. M. Brewer.

Even in these districts where every class of mining work except prospecting at the higher altitudes can be carried on the year round, there is usually less progress during the early part of the year than during the summer and autumn months; consequently the fact that progress has been slow during the first five months of 1901 is not surprising, and would hardly cause any comment, were it not for the fact that the present year will not bear comparison with either the first five months of 1900 or 1899 so far as activity in prosecuting development work in new camps is concerned.

During the same period in 1900 work was being done on the Britannia group at Howe Sound on the coast, the Frederick Arm properties of the B. C. Exploring Syndicate, the Van Anda, Marble Bay and Paris groups on Texada Island; the Lenora and Tyee claims at Mount Sicker, Vancouver Island; the Phair-Lubbe group at Goldstream near Victoria; the Three J's, Monitor and Lake Shore groups on Alberni Canal; the Callepa on Clayuquot Sound; the Indian Chief and Anaconda groups on Sidney Inlet; and the Quatsino Sound prospects.

During this period of 1901 not only have no additions been made to this list, but work has been suspended on the Britannia, Paris, Lake Shore, Indian Chief and Anaconda groups. Consequently at the first glance it would appear that instead of progressing the mining industry was really retrograding. However, this is not the case, for the following reasons.

While work has been suspended on these properties referred to for various reasons, yet other locations have been more actively operated, and development has progressed so favorably as to increase the output from the Lenora Mine and place the Monitor on the shipping list, besides causing the owners of the J. J. J. and B. C. Exploring Syndicate to instal compressors and air drill plants, and render advisable the increasing of the capacity of the hoisting machinery at the Marble Bay and Cornell mines on Texada Island.

Certainly the Mount Sicker Camp on Vancouver Island has shown the most marked progress, for in addition to the increased output from the Lenora Mine, the management of that property has built a narrow gauge railroad from the mine to Mount Sicker siding near Westholme Station on the Esquimault & Nanaimo Railway, where connection is made with the main line and the ore transferred to standard gauge cars and hauled to Ladysmith, from which port it is conveyed to Tacoma Smelter by steamer. The shipments from this property, as stated in the "Mining Record," up to March 23d, 1901, reached a total of 11,867 tons, value $175,831, as per smelter returns, and from that date to May 6th, 2,276 tons of similar ore. The same authority states that "the Lenora is worked by two tunnels, the lower being 60 ft. below the upper; a new tunnel has been started 80 ft. below the present No. 2 tunnel. This No. 2 tunnel will be run by air drills which are about to be installed, and will be 1,300 ft. long on the vein. No. 1 tunnel and drifts are about 1,100 ft. long, besides stopes which contain 17 different floors. No. 2 tunnel and drifts are about 600 ft. in length. It is estimated that above No. 1 tunnel there are at least about 50,000 tons of shipping ore; the lower tunnel has proved the existence of other ore-bodies, and the developments on this level prove conclusively that the ore body is wider at the lower level."

On the Tyee Mine during the past winter a hoisting plant, three-drill Ingersoll-Sergeant air compressor and two 50-H. P. boilers have been installed. A 3-compartment working shaft has been sunk 120 ft. It is proposed to continue this down to the 200-ft. level of the old shaft and make connections with the workings.

A new company has recently been organized to work a group of mineral claims known as the Copper Canyon group situated on the western slope of Mount Sicker and southeastern slope of Mount Brenton. The Chemainus River flows between these mountains, and will furnish ample water-power to run any machinery used on this group of claims, and probably sufficient to generate electricity for all power needed in a smelter plant. The mineral resources of Mount Sicker were only discovered in 1897, when the Lenora claim was located. Since the time prospectors have exploited Mount Brenton on the opposite side of the Chemainus River as well as the country toward Maple Bay to the eastward, but have not penetrated far to the westward. The probabilities are that during the present season a larger number of prospectors will turn their attention to this district.

So far as the coast of the mainland is concerned there is practically nothing being done except by the B. C. Exploring Syndicate on Frederick Arm. Until the long cross-cut tunnel which is being run to tap the ledge at greater depth has been driven to the point where intersection should be effected and conditions thereby determined, the possibilities of the property are problematical, notwithstanding the fact that the higher levels show a remarkably good prospect.

There is some activity in the Skeena and Omenica districts. In the former the Victoria Syndicate, which owns a body of iron pyrites, is preparing to develop the deposit, with the purpose of placing the ore on the market for the manufacture of sulphuric acid. Assays show the average sulphur content to be up to the standard required by the acid plants. The demand at present for this class of ore on the Pacific Coast is limited, but there is every probability that it will increase in the near future.

Some copper propositions owned by a syndicate of which Mr. George Gould is the reputed head are also being exploited in this district. A gang of miners were taken in by the first boat this season for the purpose of doing as much development work as possible before next winter sets in and navigation is closed.

In the Omenica District the owners of hydraulic leases have sent in their supplies and the necessary machinery. The present season's work should determine the value of at least some of the hydraulic claims on Manson and Germanson creeks, notably the ground owned by the Arctic Slope Hydraulic Company.

THE PAN-AMERICAN EXPOSITION AT BUFFALO.—III. THE ONTARIO EXHIBIT.

Written for the Engineering and Mining Journal by Mrs. Harriet Connor Brown.

The vast mineral resources of Canada are proclaimed in the Mines Building at the Pan-American Exposition by the Province of Ontario. Under the direction of Mr. Thomas W. Gibson, Director of the Bureau of Mines of Ontario, and the active superintendence of Mr. F. N. Speller, of Toronto, the Province of Ontario has collected and installed an exhibit that merits the highest praise. The sight-seer, who studies it, realizes forcibly that Ontario has aundant and varied mineral wealth and offers greater opportunities for the development of new and valuable imning industries.

The exhibit is enclosed within tall, ornate, rose-colored columns placed in a conspicuous position next to the Standard Oil exhibit in the Mines Building. The original contract was for 1,200 ft. of space, but cramped by such narrow quarters, Ontario has placed some of her largest specimens on the front and side porches of the building, where they attract the attention they so well deserve. It has been the aim of Mr. Gibson and Mr. Speller to make an economic display of Ontario's minerals that should be as representative and comprehensive as possible. With this end in view, most of the ore specimens have been taken directly from the working mines to represent the average run of ore. Only a few cabinet specimens have been added, which were obtanied principally from the collection in the School of Practical Science of Ontario. They were accepted merely that the exhibit might be a complete representation of Ontario's mineral wealth. The ores shown are in such large pieces that it is evident to all that it must have been taken from developed mines by the aid of the best modern machinery.

Perhaps the most significant and instructive features of the exhibit are the maps. A handsome geological map of Ontario, 18 by 22 ft. in size, which was made expressly for the Exposition, and which shows the details of districts explored as recently as 1900, covers the whole of one wall, and quite dominates the exhibit. The various nickel, copper, iron, gold and silver deposits are indicated by different colors. A great deal of new information about the hitherto unexplored districts of northern Ontario is indicated on the map. The observer realizes that all that vast and promising region is tributary to the Great Lakes. North of those great inland seas the largest part of the Province is still undeveloped, but it is clear that railways are being rapidly projected which will render its riches readily accessible to the rest of the world. Hundreds of valuable water powers are likewise in evidence. The script of the map also sets forth the fact that the mining laws of Ontario are liberal; that mining lands can be leased from the crown for $1 per acre the first year and 15c. to 30c. during subsequent years, or they may be bought outright for $2 to $3.50 an acre.

THE ONTARIO MINES EXHIBIT AT THE PAN-AMERICAN EXPOSITION.

Another large map that occupies a conspicuous position on one wall of the exhibit was designed by Mr. F. H. Clergue for the Lake Superior Power Company, which has developed the water power at Sault Ste. Marie. The central position which the "Soo" occupies and which gives it such a decided advantage as a coming point of industrial activity is well shown, its important lines of communication with other parts of the Province and the States bordering on the Great Lakes being indicated by a chain of vari-colored incandescent lamps. The new line of the Algoma Central Railway to Hudson Bay, which is already partially completed, is strikingly shown with the character of the country

through which this line passes. The picture of a 137-ton locomotive, which hangs near the map, shows what style of engine is used to drag heavy loads of ore and pulp wood across that semi-mountainous, heavily-timbered country.

The Lake Superior Power Company exhibits iron made from the ores of the now famous Helen Mine at Michipicoton on the north shore, ferro-nickel from Sudbury, pyrrhotite, and also iron ore, from the Frances and Josephine mines, now being opened up. A good supply of granite and sandstone is also exhibited by the same company, the latter being the material used in the construction of the great mills now nearing completion at Sault Ste. Marie. Pictures of the new ferro-nickel and steel plant and the sulphite pulp mill, handsome structures built after the heavy Norman style of architecture, are included in the exhibit.

A highly instructive chart, which shows the comparative elastic limit, tensile strength, ultimate strength and elongation and also the comparative cost of carbon steel and nickel steel is exhibited by the Lake Superior Power Company. Another chart illustrates very graphically the extent of Ontario's output of nickel compared with that of the rest of the world. Nevada is almost the only source of nickel supply in the United States and its output might be represented by the figure 22, Canada by 526, and the rest of the world by 952, thus illustrating the fact that Canada supplies a large proportion of the nickel used in the world.

This same enterprising company also illustrates the electrolytic process of manufacturing soda from salt as carried on in the plant at Sault Ste. Marie.

In view of its importance as a Canadian industry, it is fitting that the nickel display should occupy the important position that it does in the front of the exhibit. Pieces of nickel ore from 5 tons in size to 1,000 lbs. are arranged in a picturesque heap inside a noticeable and costly 16-ft. railing made of solid nickel and intended to show that nickel can be cast. The Canadian Copper Company has contributed to this exhibit specimens from half a dozen of its more important mines. The 5-ton specimen, which tops the heap, is from the Copper Cliff Mine. It contains about 5 per cent. nickel and 4 per cent. copper, representing the usual grade of ore.

Besides containing specimens of the nickel ore, the exhibit of the Canadian Copper Company illustrates all the operations of nickel manufacture from the ore to the finished product. Samples of the roasted ore are shown; of the copper-nickel matte, and the bessemer matte, which is high in copper and nickel, and low in iron. This bessemer matte runs about 46 per cent. copper and 34 per cent. nickel, which is as far as the process of concentration is carried in Canada at present.

The Orford Copper Company, whose works are at Constable's Hook, N. J., takes the matte at this stage and refines it, obtaining by an electrolytic process pure nickel and copper. The nickel is shown as deposited in sheets, in the form of ingots, ribbons and wire. A similar process for the electrolytical refining of copper matte is similarly illustrated.

Other exhibits of the nickel industry are made by the Ontario Smelting Works, the Ludwig Mond Works and the Nickel-Copper Company, of Hamilton. The last-named company makes an exhibit of nickel and copper reduction according to the process invented by their chief engineer, Mr. Hans A. Frasch. As the company is about to erect a large plant for nickel production by the Frasch process, this exhibit at the Pan-American Exposition is of special interest to a great many people. The exhibit consists of a collection of large bottles in which the chemical series of operation is prettily shown, including the black solution of the matte, the green nickel chloride solution, the lavender nickel and copper ammonium chloride, the nickel ammonium salt, the nickel oxide, cobalt solution, nickel and copper electrolytically deposited, and caustic soda.

This is the largest and most complete exhibit of nickel-copper ores of Ontario and their products that has ever been brought together. It aggregates about 17 tons in weight and includes average samples from every important mine.

A large quantity of copper ores is naturally included in the exhibit. One specimen weighing 5 tons is from the Rock Lake Mine, north of the Bruce Mine in the Algoma District. There is a 24-ft. vein of this ore in the mine. A 200-ton concentrating plant is now in operation there, as shown by photographs in the exhibit. Two tons of copper ore from Massey Station are also among the exhibits. Other specimens from the Tip Top Mine, which is northwest of Port Arthur, on the Canadian Northern, are worthy of mention. A large piece of copper ore weighing about 3 tons from the well-known Bruce Mines is exhibited, with photographs of the new 400-ton concentrating plant at that point. A few beautiful specimens of bornite are shown from Parry Sound, Georgian Bay. The copper exhibit, which weighs in all about 10 tons, is fully representative of the various economic copper ores.

Particularly striking and valuable is the Ontario exhibit of iron ores, which are listed from widely different parts of the Province. In Eastern Ontario the deposits of iron ore are very numerous. From Peterborough and Hastings counties, the center of the Eastern Ontario iron industry, come some very fine products. The ore of this region is, in nearly every case, magnetite. It occurs in veins, often several hundred feet wide, notably at the Blairton Mine, Belmont Township, Peterborough County, where it has been worked to a depth of 300 ft. A number of the mines of this region are regular shippers to the smelters of the Hamilton, Deseronto and Midland furnaces in Ontario, as well as to outside ones. Among the more important shipping mines of this district which are represented in the exhibit are the Walbridge, Empey, Lee, Coe Hill, Lee-Mills, Seymour, St. Charles, New Find, Spragge and Childs, all in Hastings County; the Blairton in Peterborough County, the New York, Ledyard, Pine Lake, Howland and Imperial in Haliburton County and the Roberts in Frontenac County. The magnetite in some of the deposits contains small quantities of intermixed quartz grains, but is oftener high grade, running from 50 to 65 per cent. in metallic iron, and being low in phosphorus, sulphur and titanium.

North of Lake Huron, in the Algoma and Nipissing districts, and in the vicinity of Lake Temagami, beds of iron ore have been found recently, and explorations are now being made by the Government and by individuals with a view to learning their extent. The ore is magnetite, interbanded with jasper, and somewhat similar to that of the Mattawin Iron Range west of Port Arthur.

In the Michipicoton Mining Division on the north shore of Lake Superior lies the most important bed of iron ore yet found in Ontario. It constitutes the Helen iron mine, and is owned by the Lake Superior Power Company, one of the subsidiary companies of F. H. Clergue's syndicate. The ore is solid hematite. It occurs in an immense body between hills of Laurentian and Huronian schists. It has been traced on the surface over an area of about 1,500 sq. ft. ,and is already uncovered and worked over an area of 600 by 500 ft. A diamond drill hole was put down 200 ft. through solid ore all the way, and, as the body of ore rises another 100 ft. above this, the total depth of the lode, as far as explored, is some 300 ft. A 12-mile railroad carries the ore to Michipicoton Harbor, and it is there transferred to vessels owned by the same company, and carried to the Midland Blast Furnaces on Georgian Bay. The Lake Superior Power Company is now erecting an immense plant at Michipicoton Harbor to treat the ore there in the near future. The Joseph and Frances mines farther inland, which are owned by the same company, bid fair to rival the Helen Mine.

A typical analysis of the Helen iron ore is:

Iron	56.190 per cent.
Phosphorus	0.056 per cent.
Sulphur	0.061 per cent.

Analyses of the main red ore body show as follows:

	1.	2.	3.
Iron	62.750	62.460	61.000
Phosphorus	0.064	0.047	0.071
Sulphur	0.020	0.025	0.042

Analyses of the Josephine ore show:

	1.	2.	3.
Iron	60.370	58.380	64.450
Phosphorus	0.015	0.031	0.028
Sulphur	0.018	0.057	0.038

In the vicinity of Port Arthur, there are many veins and beds of magnetite. These are as yet only in the exploration stage, not having been developed sufficiently to have any quantity of ore for shipment. Samples of the ore have, however, found their way to the Pan-American Exposition.

About 35 miles west of Port Arthur is the Mattawin Iron Range, which consists of a large number of hills outcropping along the Mattawin River. The ore found there consists of iron and jasper interbanded some 200 ft. wide. The magnetite is very high grade, but the jasper occurs in fairly large quantities, in comparison to the magnetite. Extensive diamond drilling is at present under way among these hills.

Farther west still, along the Atikokan River, is another range of iron ore, a narrow belt, 20 miles long, of Huronian schists lying in Laurentian rocks. The ore is magnetite of a very pure variety, lying in bands 15 to 40 ft. wide, as far as explored. The Canadian Northern Railway, which was completed this spring, runs along this range from end to end. Some of the finest specimens of iron ore in the exhibit are from the Atikokan Iron Range.

One of Ontario's mineral products that is of increasing importance nowadays is graphite. A column of graphite from the Black Donald Mine, Eastern Ontario, holds, therefore, an appropriate place in the center of the aisle which intersects the exhibit. The foundation of limestone is from the Queenstown Quarry Company. On it are placed three huge blocks of graphite, one upon the other, the first measuring 3 ft. by 4 ft. by 3 ft. Surmounting the whole is the serene and dignified figure of Canada, bearing a Dominion flag. The figure is made of gypsum and has been prettily shellacked. It makes a graceful and symbolic presiding genius.

Nickel, copper, iron and graphite are only four of Ontario's many minerals. The Province boasts besides of deposits of gold, silver, zinc, lead, arsenic, platinum, molybdenum, mica, actinolite, talc, corundum, gypsum, apatite, barytes, marl, clays for brickmaking and pottery, salt, petroleum, limestone, granite, sandstone and marble. Of those we must speak another time.

THE TREATMENT OF AURIFEROUS MISPICKEL ORES AT DELORO, ONTARIO.

By P. Kirkegaard.

1. The Mining and Milling.

The ores of the Deloro Mine consist generally of quartz more or less heavily impregnated with arseno pyrite—mispickel—with occasional copper pyrite and frequently a large percentage of iron sulphide. These ores are worked for their gold and arsenic contents. The above description applies to the Gatling or main lode, and also the Tuttle lode. Other veins are being worked which are quite different in composition, in that they contain a large percentage of both oxide and hematite of iron, and in one case a great deal of graphite, and these latter ores require different treatment from the former to get best results. This paper is only intended to cover the treatment of the mispickel ores.

These ores are mined in the usual manner. Where possible the shafts are sun to follow the lode on the incline, and levels are driven north and south. The strike is nearly north and south, and the dip varies from 45° to 63° to the horizontal. The lode is irregular, varying in size from 4 to 5 ft., the average to 25 ft. in places. There are no defined walls; as a rule the quartz is merging into the wall rock, which is in some places talcose schist—in others diorite, the latter being the country rock. The Gatling lode is now being worked to 4th level, being a depth of 340 ft. on the lode, and sinking a further 100 ft. is now being done to open a 5th level.

The ore is hoisted to the shaft house in skips, dumped over a grizzley, the fines going direct to storage bins and the coarse carefully culled.

* Papers read before the Canadian Mining Institute at the Montreal meeting.

As a rule the white quartz carries little value, hence this and all country rock is returned through a chute to the mine, where it serves a useful purpose as filling in the stopes. All milling ore is passed to storage bins; from here it is filled into cars and transported to the mill over an inclined three-rail tramway 800 ft. long.

Arriving at the mill, the ore is again dumped over a grizzley, fines going to bins, of which there are two, and the coarse to the rock breakers; the latter being set to crush to 1-in. ring. The feeders are the usual Challenge pattern, two ordinary in wood frame, and two suspended. The stamps, of which there are 20, weigh 850 lbs. each when newly shod. Ten stamps were erected in 1898; the other 10 have been added recently. The old 10 stamps drop 100 times per minute and are given 7 to 8 in. drop; the discharge is from 6 to 8 in. After running a mill two years on any ore, improvements naturally suggest themselves, so in this case, when the last 10 stamps were added they were set to drop 110 times a minute with 6 to 7 in. drop, and corresponding discharge. This has proved to be a move in the right direction, and has increased the efficiency above the old 10 stamps; these latter will be set to the same speed shortly.

The water feed, as described by Mr. Bernard MacDonald, has been introduced, and this, at least for these ores, is an advantage. The writer is aware that this method of water feed has been criticised severely, yet he does not hesitate in stating that for an ore similar to the one in question it has much to recommend it; nor can he see any reason why it should not give continued satisfaction and even less trouble than the old method of feeding the water above the stamps.

The screens used are 40-in. burr slot. These are watched closely; as soon as they begin to open, other screens are put on, and those taken off are closed with a little hammer specially made for this purpose; and in this way the same screen will do 5 to 6 turns of 2 and 3 days each, giving a fairly uniform product, well suited for leaching. Crushing through 40 mesh has been found to give best results; taking a sample of the battery pulp, nearly all the mineral will pass through a 60-mesh screen, leaving the quartz on the screen. The crushing capacity of this mill has been with the first 10 stamps a little over 3 tons per stamp per 24 hours, or an average of 800 tons per month. The improvements on the new stamps have brought the capacity up to 4 tons per stamp.

Amalgamation inside of mortars is done on back plates and front chuck; the former is kept partially under the pulp and is protected by another plate 1½ in. above it; the chuck block is the usual shape. Most of the amalgam is caught on the back plate, where it forms into hard lumps and ridges. Very little loose amalgam is found on the mortars on clean-up, and no coarse gold worth considering. Great care is necessary in feeding quicksilver to the mortars; a slight excess will soften the amalgam, when it is quickly scoured off by the very dense pulp, is broken up, and then issues through the screen in a very dirty state and is lost as far as amalgamation is concerned; in such cases it is, however, caught with the concentrates either in the trap or on the concentrators, and finally saved in the leaching. Too little quicksilver soon allows the amalgam on the inside plates to become dry and hard, and a dirty film forms, when all further amalgamation ceases. Owing to the extreme care necessary, as above described, and the varying character of the ore as regards per cent. of mispickel, and quantity of gold

THE ONTARIO EXHIBIT AT THE PAN-AMERICAN EXPOSITION.

amenable to this method of amalgamation, no exact data can be given as to per cent. saved inside the mortars; but 20 per cent. of the total assay value in the ore is fairly approximate.

Amalgamation on the apron plates must also be watched with unusual care or the plates will soon show a dirty film, due in part to the fine mispickel, which inclines to adhere to the plate like a paint, and which requires force to remove it. The plates are 6 in number, each 24 in. in length by the full width of the mortars, and there is 1 in. drop between them. The plates are set with an incline of 2¼ in. per foot; this is necessary to keep them clear, and even at this steep angle they will frequently clog. As little water as possible is used, so as to obviate the rapid motion of the pulp that naturally would occur over such a steep plate, and also to save the concentrators from an unnecessary amount of water.

The amount of water as compared with ore is necessarily greater for an ore of this kind than would be needed for an ordinary free-milling ore. Heavy silver plating is best for this kind of ore; it has been found that as soon as the silver is worn thin the copper will show tarnish. This can be counteracted by building over it with gold; but gold in this case does not form as desirable an amalgamating surface as silver; the former will become hard and dry and soon ceases to work, whereas silver will retain a plastic surface. Owing to this, 4 oz. of silver per square foot of plate has been adopted, and with care in dressing the plates this coating will last almost indefinitely. No cyanide is used except in extreme cases, such as after a long stop or when ores containing much free iron is being milled, in which case spots very much resembling grease will form all over the plates; these are best removed either by a weak solution of cyanide or preferably a little caustic soda. The plates are dressed every two or three hours, according to need; this dressing being done with a rubber consisting of several layers of soft wool blanket fastened on a wooden paddle, and this rubbing is followed by a brushing with a whisk.

Under normal conditions, when milling the regular mispickel ores, a saving of from 50 to 62 per cent. is effected by amalgamation in mortar and on plates, the average for several months being 57 per cent. of assay value. The gold is occasionally found tree and fairly coarse, but this is the exception, close investigation having shown that the gold is locked up in the mispickel in a very finely divided state; it is therefore necessary to crush fine to at least partially liberate this fine gold to fit it for amalgamation and subsequent leaching by bromo-cyanide.

The pulp, on leaving the plates, is passed through a suspended screen hanging under the lower end of the table; here all stray pieces of coarse pulp that might escape from the mortars when changing screens are caught. Below the screen, and before reaching the concentrators, the pulp is made to flow through a trap; here any stray amalgam is caught. These traps, one for each battery of 5 stamps, are cleaned out every 12 hours, the contents panned down and closely observed, and this serves as a good indicator of the work done in mortars and on plates, and precautions are taken accordingly. The pulp from the old stamps passes over 6-ft. corrugated-belt frue vanners, one for each 5 stamps. The tails from these two vanners join in one launder and are allowed to flow into a series of hydraulic classifiers, 3 in all; here a partial separation is effected, and three grades of pulp are thus obtained—coarse, medium and fines. Each of these products is run over a 6-ft. smooth-belt vanner, and each of these vanners is adjusted as to speed, inclination, travel and wash water, to suit the particular pulp flowing over it; in this way a very close saving is effected. The average tailings from this second set of vanners carry only 2 to 2½ per cent. of the original gold and 0.5 per cent. of the mispickel contents of the milling ore. The concentrates from the first two vanners, forming the bulk, or approximately 75 per cent. of all concentrates produced, are shoveled into cars, together with those produced by the second set of vanners, and thus become mixed. The concentrates from two of the last-named vanners are very fine slimes. No water is allowed to leave the mill except what has passed over the vanners. It was soon found, when stamps were first adopted under the present system, that the water, even when apparently free from sand, still carried a high value both in gold and per cent. of mispickel. This loss has been checked very effectually by classification, as above described, and by carefully adjusting each vanner to suit the class of pulp passed over it. For the new section of the mill, Wilfley tables have been adopted, one for each 5 stamps, the tails from these flowing through one classifying cone, where all coarse sand is extracted, and, with a limited amount of water, flows to a three-deck Bartlett table. The surplus water from the classifier, still carrying some fine sand and all the slimes, flows to the three-compartment classifiers and is treated with similar pulp on the smooth-belt vanners. All concentrates are transported in side-dumping cars to the leaching plant, where they are treated by the bromo-cyanide process.

The concentrates, after the extraction of their gold contents, are sent to the arsenic works, where they are calcined for the arsenic they contain. The crude arsenic resulting from the calcination is in turn refined, and produces white arsenic—arsenious oxide—analyses of which show 99.4 to 100 per cent. pure $As_2 O_3$. It is of a pure white color.

This is the only arsenic-producing plant on the American Continent manufacturing arsenic on a commercial scale. The production is 40 to 50 tons per month, and this will be further increased shortly.

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2. The Leaching of the Ores.

By Sydney B. Wright.

Before proceeding with particulars as to the actual treatment of the concentrates mentioned by Mr. Kirkegaard, a few words on the chemistry of the process adopted will be in order. Briefly the process consists in:

1. The extraction of the gold by the leaching of the finely-ground ore with a dilute solution of potassium cyanide, to which is added a small quantity of a solution of a haloid salt of cyanogen—cyanogen bromide.
2. The precipitation of the precious metal from this bromo-cyanide liquor by means of metallic zinc.
3. The clean-up of the zinc-gold slimes thus obtained.

In comparing the equation representing the solution of metallic gold by the bromo-cyanide solution: $3\ K\ Cy + Au_2 + Cy\ Br = 2\ (K\ Au\ Cy_2) + K\ Br$, with Elsner's well-known equation for the solution by potassium cyanide, $4\ K\ Cy + Au_2 + H_2 O + O = 2\ (K\ Au\ Cy_2) + 2\ K\ O\ H$, it will be readily seen that whereas in the former case the reaction is one of cyanidation only; the latter, as is now generally admitted, involves oxidation, a reaction, the disadvantages of which in the treatment of ores rich in sulphur, arsenic, etc., are apparent. On this point and on the extreme activity of the bromo-cyanide solvent on the precious metals, together with the method of application of the process, depends the successful treatment of these dense concentrates.

The plant now in use, and which is placed in a two-story building below the mill, consists of 4 leaching vats fitted with sand-and-pebble filter bottoms and bottom discharge gates; four solution or liquor tanks, on the floor above the leaching vats; three small Northey duplex steam pumps for pumping liquors; three small sump tanks—40-gal. barrels—over which the steam pumps are so placed that by means of a float connected by a rod to a lever on a special type of throttle valve the speed of the pumps is regulated automatically by the rise and fall in level of the liquors flowing into the sumps, two 50-gal. barrels hold the stock solution of cyanogen bromide; one Sulman's patent cone for the use of zinc fume or dust as the precipitant; one settling box connected with same, but which will shortly be replaced by a small filter-press or other form of filter; one zinc box through which all drainings only from the vat charges are run.

The pipe systems employed are so arranged that the liquor from each tank may be run to any leaching vat independently; similarly, the systems fitted to the bottoms of the leaching vats run to the small sumps from which the liquors having percolated through the charge of ore may be pumped to any of the liquor tanks desired. Asbestos-packed cocks are used in all these pipe systems and have proved a great advance on the old iron plug cock for this work.

The clean-up plant in which the zinc-gold slimes obtained in the precipitation of the gold from the liquors by means of metallic zinc are treated, consist of one acid-treatment tank fitted with a hood and stack by which the obnoxious gases evolved during the acid-treatment are carried immediately out of the building; one settling tank and one filter tub, into which the slimes are run after acid treatment and washing.

This, briefly, comprises the whole of the plant used in the extraction building. The final smelting of the slimes is carried out in the bullion room attached to the laboratory.

The wet concentrates as received from the mill consist principally of mispickel, some iron pyrites carrying small but varying quantities of copper, and 15 to 20 per cent. of quartz-sands. The latter is taken over purposely on the concentrators and plays an important part in rendering these dense concentrates leachable. In this connection it may be mentioned that experiments were made by the writer on the separate treatment of three grades of the sized concentrates, but the results obtained were inferior to those which the mixed products gave. The wet mass of concentrates, mixed to some extent in the concentrator room and transferred in side-dumping cars to the leaching vats, is therefore dumped direct into the latter and a small quantity of caustic lime added. Here a further slight mixing is given by shoveling and spreading occasionally until the vat contains a charge about 3 ft. deep, or approximately 40 tons of concentrates. The surface is now leveled off and the charge sampled.

The sample obtained by the usual method of withdrawing a small quantity from each car-load by means of a pipe was soon found to be unreliable, and was therefore abandoned. The method now adopted consists in taking drillings by means of a 2-in. auger, 3 ft. long, the entire depth of the vat charge. The pulp thus obtained from 20 to 30 drill holes is then well mixed, quartered down in the usual way, and found to constitute a very accurate sample.

The charge is now submitted to a short water wash in order to get rid of the soluble cyanicides formed by the exposure of the moist concentrates to the action of the air during the filling of the vats, and this is the only preliminary treatment given. After partial draining, or as soon as the water has disappeared below the surface of the ore, the cyanide solution of liquor is run on together with the requisite quantity of cyanogen-bromide solution. The original quantity of solution or liquor, which, for convenience, may be called the strong liquor, run on is, in all, approximately one-third of the weight of the ore charge, or 13 tons. Formerly a weak cyanide solution was run on previous to the above-mentioned liquor, with the idea of reducing cyanide consumption. This weak liquor, however, was found to exert practically no influence in the latter respect, and at the same time dissolved only a very small quantity of gold. It was therefore abandoned and the length of treatment materially reduced in consequence.

The first-mentioned liquor having been run on to the charge, the water remaining from the preliminary wash, and now being replaced by the bromo-cyanide solution, is run out through the zinc boxes. At this stage a somewhat radical departure from ordinary practice is made, and one which has proved a necessity in treating this refractory material. It being the fact, as in nearly all leaching operations, that the first portion of the liquor to pass through the ore charge is extremely rich, comparatively, in the dissolved metal, a rapid and easy means of ascertaining the correct point at which to switch to the liquor tanks becomes necessary. The usual silver-nitrate test, though applicable in the treatment of most ores, was found unsatisfactory in this case even in skilled hands, and since it frequently happens that such tests must be made by the workman in charge of the vats, it will be readily understood that a simple and decisive test is an absolute necessity. It was found on examination that the very dilute solution first appearing through the charge, although extremely weak in K Cy, contained an appreciable quantity of soluble ferrocyanides. Advantage was therefore taken of this fact to apply the delicate prussian blue test, by adding ferric chloride solution to running samples drawn from the zinc boxes. By this means on the first appearance of gold-bearing solution a distinct prussian blue coloration is obtained, and the operator knows at once when to switch to the liquor tanks.

The departure from ordinary practice mentioned above now takes place. It consists in switching this very dilute (in K Cy) solution not

to the weak but to the strong tank; and as a further distinguishing point between bromo-cyanide treatment generally and ordinary cyanide practice, it may here be mentioned that this strong liquor may be used—without any precipitation of the gold by zinc or other means—until it contains as much as 6 to 7 oz. of gold per ton of liquor, if desired. This practice, although considered unsafe in many cases in ordinary cyanide work, is perfectly free from danger in the bromo-cyanide treatment of this ore. On the latter case it is also advantageous to precipitate the strong liquor as seldom as possible within the above-mentioned limits on account of the fact that by contact with metallic zinc the cyanogen bromide is decomposed and the liquor thus rendered much less active.

To revert to the actual treatment of the charge, the blue coloration having been obtained and all the liquor having been run on, the solution now percolating through the charge is run to the strong tank and is brought up to correct strength by the addition of the requisite quantity of K Cy. Constant slow percolation of the liquor through the ore is found to render the solution of the gold much more rapid than if soaking and percolation be adopted, and for this reason the liquor is run back to the strong tank, as stated previously, and is run on to the charge at intervals with the requisite quantity of Cy Br solution.

After 24 hours' leaching it is found that 60 to 70 per cent. of the gold contents have been extracted, and at this point it is advantageous to drain the charge and turn the mass by shoveling, in order to break up and mix any clots of fine mispickel which may be present, and thus expose fresh surfaces to the action of the bromo-cyanide liquor. The latter is now again run on and the leaching continued until assays of samples of the liquor show that the extraction is completed.

A weak wash liquor is now run on to replace the strong solution, the latter being run off at full bore of the pipe. As soon as the original 13 tons of strong liquor have been collected the stream is switched to the weak tank and a water wash run on to the ore. The original quantity of weak liquor used is collected, and this collection is continued until a running sample of the washings shows on testing that the stream may be run out through the zinc boxes. In this way, it will be noticed, the quantity of strong liquor in use is retained at the original 13 tons, while the weak or wash liquor is allowed to increase in bulk with each leach. By this method the strong liquor is refreshed with clean solution in each charge treated, and on the great activity of the bromo-cyanide solvent in conjunction with this retaining of the working solution in a clean condition depends largely, in the writer's opinion, the successful treatment of these concentrates. The weak wash liquor accumulated as above mentioned is used to wash several charges and is always precipitated ahead of the strong solution, so that when the latter is rich the former is practically free from gold.

For precipitating the gold, zinc fume or dust is employed. The plant consists of an inverted cone of sheet iron 4 ft. 6 in. in diameter and of the same depth. This is fitted at its apex with a three-way cock and a small perforated cone, which serves to distribute the stream uniformly, thus ensuring thorough admixture of the liquor with the zinc fume, which is run in at intervals through a central funnel and pipe. The latter is expanded at its lower end into an inverted funnel, and by deflecting the stream of liquor helps to mix the fume and liquor still more thoroughly. The liquor to be precipitated is run from the storage tanks into a 40-gal. barrel, the delivery into which is fitted with a ball-cock in order to obviate any chance of overflow. This barrel is connected with the three-way at the apex of the cone by a pipe, and being placed above the top rim of the cone serves to maintain a constant head. The liquor thus runs direct into the bottom of the cone and meets the zinc fume just above the distributing rose. In the upward travel, however, of the solution the zinc and zinc-gold particles descend again into the precipitation zone by reason of the decrease in velocity of the currents with the increasing area; thus a small quantity of the fume exposing, in proportion, an enormous surface of metallic zinc to contact with the liquors, serves to precipitate the gold from a large quantity of liquor.

The precipitated liquor, which, by the time it reaches the rim of the cone, carries only a small quantity of suspended matter, now overflows into a peripheral gutter and thence to a wooden settling box containing two compartments in which a number of glass plates, 24 by 18 in., are placed at an angle of 45°. Thence the perfectly clear liquor flows to the sumps and is again ready for use on the ore charge.

The gold-bearing precipitate, whether obtained from the zinc boxes or from the fume cone, is now treated with sulphuric acid in order to get rid of the zinc present. This is carried out in a room adjacent to the extraction building, all the precipitate collected during the month being treated in one lot in the acid tank. The strength of acid used is approximately one part in ten parts of water. The moist precipitate is placed in the acid tank, the requisite quantity of water added, the hood—which is fitted with a small glass window front and back, so that the action may be observed—closed down, and the acid run in through a leaden funnel. The mass is stirred with a wooden paddle the handle of which projects through a small opening in the front of the hood, and as soon as the first violent evolution of gas has subsided somewhat more acid is run in. The stirring and additions of acid are continued until the reaction is seen to be complete. The tank is now filled with cold water, stirred well and allowed to settle. By using cold rather than hot water a more rapid settling of the gold slimes is effected, and after two further decantation washings the slimes are obtained free from zinc sulphate. All the washings from this are run into the settling tank, in which they are allowed to stand until thoroughly settled; the clear solution, which on assay shows only traces of gold, is then run off and the small quantity of fine precipitate on the bottom of the tank collected.

The gold slimes in the acid tank are rinsed into the filter tub as soon as the third wash has been run off, and after draining are transferred to shallow sheet-iron trays. These are placed in a special form of oven furnace, in which the contents are first dried and finally heated to a dull-red heat. The furnace itself consists of a small wind furnace, which is used for the melting of bullion and which is fitted with a hinged damper so that when required the trays containing precipitate may be heated by the waste heat from the furnace. This is effected by placing the trays on shelves in the oven, one above the other, in such a way that the spaces between them form the flue through which the furnace gases pass to the stack. By this means the objectionable vapors evolved during the roasting of the slimes are carried away, and at the same time no loss by dusting is experienced on account of the large flue area allowed between the trays. The roasted slimes are now mixed with a suitable flux, smelted in clay crucibles—which for safety are placed inside graphite pots—and the smelt finally cast in the usual brick molds. The slags obtained, which are exceptionally clean, are allowed to accumulate and are treated at intervals by Caldecott's process.

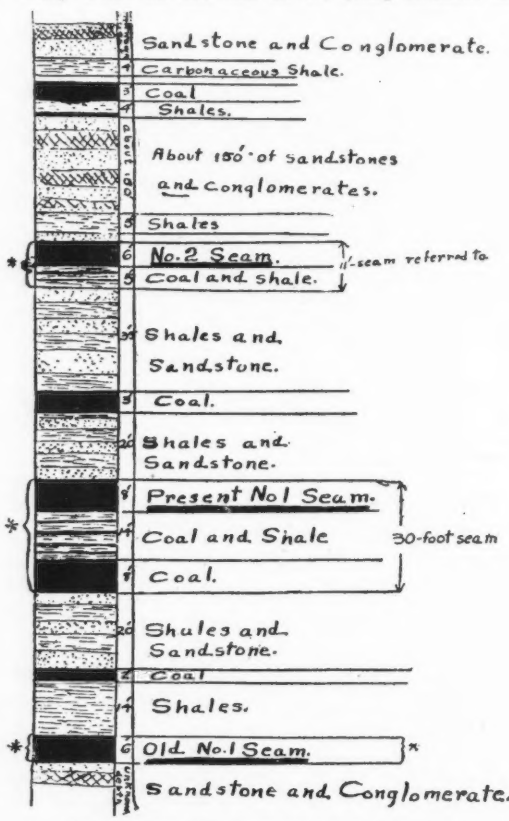
Although this paper has been confined to the treatment of one particular class of material it may also be mentioned that the writer has had opportunities for making comparative tests of the merits of the bromo-cyanide as compared with the ordinary cyanide process in treating ores and tailings of various descriptions, and has found that with practically all the so-called refractory ores treated the best results, both as regards cost and extraction, have been obtained by using the bromo-cyanide process, the difference being sufficient in many cases to convert an uneconomical treatment into a profitable operation.

The following figures representing the chemical consumptions and extraction on the concentrates, in conjunction with the saving effected by amalgamation, speak for themselves: Potassium cyanide per ton of concentrates treated, 2.0 lbs.; cyanogen bromide per ton of concentrates treated, 0.5 lb.; zinc fume per ton of concentrates treated, 0.19 lb.; total length of treatment, 80 to 100 hours; extraction of gold from concentrates, 87 to 94 per cent.; an average of 90.5 per cent. This latter, with the values saved by amalgamation, gives a total saving of 88 to 90 per cent. of the original gold contents of the milling ore, a result which, as an average of two years' steady work, will, it is thought, be generally admitted to be exceptional on so refractory an ore.

THE CROW'S NEST PASS COAL MINE.*

By C. V. Corliss.

The coal-fields in which are conducted the operations of the Crow's Nest Pass Coal Company lie just beyond the Crow's Nest Pass over the continental divide at a distance of about 40 miles from the international boundary. They front on the Elk River, being situated in the most



GEOLOGICAL SECTION AT COAL CREEK.

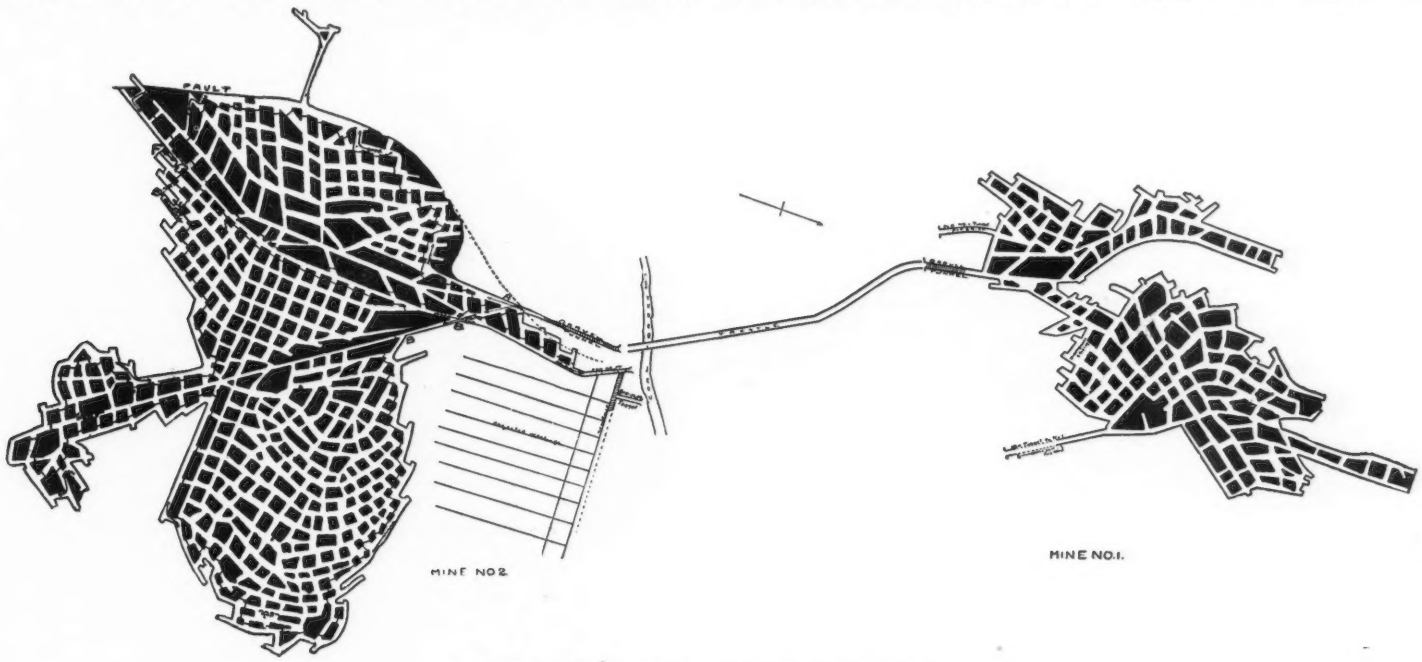
southeasterly mining division of British Columbia, that of Fort Steele. The mines are situated in Coal Creek Valley, 5 miles east of Fernie, a town at the confluence of this stream with the Elk River. They are at an altitude of 3,800 ft. above sea level and 525 ft. above the townsite of Fernie. The measures have the usual rolling character of all Rocky Mountain coal-seams. Their general line of strike is approximately north and south. Their dip varies from level to about 20° or 25°, the rise being toward the west. The outcrops are, therefore, along the mountain sides to the west, at varying heights. The mines, Nos. 1 and 2, are situated respectively on the north and south sides of the valley, about 1,000 ft. apart. Though relatively on the same level, the mines are not opening up the same seams, as shown in the accompanying geological section. Old No. 1 tunnel, on the north side of the valley, opened up the lower 6-ft. seam shown in the sketch, but this seam has been abandoned for the present, the tunnel being used as a return air-course for No. 1 mine. The new No. 1 tunnel is working an 8-ft. seam

*Abstract of paper read at the Montreal meeting of the Canadian Mining Institute.

of excellent quality. This seam is the top section of the 30-ft. seam, shown in the geological section, and is situated about 50 ft. above the original 6-ft. seam. No. 2 tunnel, on the south side of the valley, has opened up the upper portion of the 11-ft. seam shown in the section. The upper 6 ft. is being extracted. The under 5 ft., constituting the pavement, is alternating bands of coal and shale. This forms, generally, a splendid floor. The roof of this mine is of great strength and regularity.

These coal measures occur in the Laramie formation of the upper Cretaceous series of rocks. In this district this formation comprises some thousands of feet of alternating bands of conglomerate and sandstone, the single strata varying from a few inches to hundreds of feet in thickness. At frequent intervals in these strata, but always immediately beneath a layer of sandstone, occur the coal-seams with their accompanying carbonaceous shales. The geological section for which the measurements were made by the writer, while engaged at this colliery during the summer of 1900, shows the arrangement and thickness of the near lying strata at the Coal Creek Colliery. It would appear that the strata of conglomerate were laid down along an ancient sea beach that oscillated back and forth owing to the repeated, alternate elevations and depressions of the Laramie sea bottom, the coal-beds marking long periods of small emergence and persistent marshes in the alternating changes of level. The valley is glacial.

The estimates of some engineers place the quantity of coal within this area at 25,000,000,000 of tons, which would admit of an output of 25,000,000 tons a year, or 70,000 tons a day for 1,000 years. Doubless the use of the diamond drill in the valleys would reveal many as yet undiscovercd seams. The coal in the seams exposed up to the present is very uniform and of excellent quality. It is said to be the best coking coal in America, the coke possessing high calorific power and great crushing strength, two most important qualities demanded of coke that is to be used for smelting.



PLAN OF MINES, COAL CREEK, BRITISH COLUMBIA.

In order to concentrate the surface labor and shipping plant, the mine tunnels are connected by a trestle 45 ft. high above Coal Creek. The weighing and sorting building is placed upon the trestle equidistant from the mine entrances. This building contains the scales, Mitchell tippler for dumping the mine cars, shaker screens, traveling picking-table, engine for the screens and picking-table, and loading arrangements to facilitate shipment in railway cars.

In both mines the coal is being extracted on the pillar-and-stall system, the seams being too thick to be successfully worked by longwall. The main levels and headings are driven 12 to 14 ft. wide, and the rooms or stalls about 18 ft. wide. The stalls are driven parallel as far as the undulations of the strata will permit, and are connected by cross-cuts at intervals of 50 or 60 ft. This is done in order to short-circuit the air and dispense with the temporary brattice. As will be seen from the plan, owing to difficulties in haulage arising from undulations of the mountain strata, the pillars are somewhat irregular both in size and position. They are, in general, about 45 ft. square, and are being increased in size as the workings extend north and south into the mountains, which rise precipitously above the mines to the height of about 2,000 ft. This increase in size is in order to prevent a crush of the pillars or a creep in the overlying strata resulting from the enormous superincumbent pressure. It is not probable that any of the pillars will be robbed until all easily accessible overlying seams have been extracted. In order to stop a creep, should one occur, it may become necessary to rob a section of 500 or 600 ft. square and allow the roof to settle.

At present all cutting is done by hand. Much of the coal can be easily brought down by means of the pick alone, after the usual undercut has been made. In gassy rooms the maul and wedge are used to bring down the coal when digging is difficult. But in rooms in which naked lights are used, after the undercut has been made, the coal is blasted down by means of No. 2 or 3 black powder. The amount loosened by a good shot is 1 to 3 tons. The average consumption of powder is 1 lb. per 5 tons of output. A shot-lighter has charge of the placing and depth of all holes, and of discharging all shots. The rate of work is about 8 to 14 tons per pair per shift of 8 hours in wide work. In narrow work in a 6-ft. seam a pair averages about 1 cu. yd. per shift.

The undulating character of the seams renders haulage a difficult problem in engineering. The main haulage is operated for about 2,000 ft. by an electric motor in each mine. The grade of the motor tracks is 2 per cent., rising inward as far as the first bend in the main haulage road, shown in the plan, after which it is variable. In No. 2 mine the main motor haulage was extended 600 ft. by means of an electrically-driven stationary hoist. The grade of the track for the hoist varies from 15 to 20 per cent., being too steep for the motor. The hoist is geared to give a cable-speed of 2 miles per hour. The secondary haulage in each mine is by horses, and is under the superintendence of a foreman driver in each. The foreman driver remains at the landing, and oversees the coupling and starting of the motor trips. Each driver hauls, on the average, about forty boxes per shift, from four working places to the landing—a distance not exceeding 300 ft. It is found to be bad economy to let the round trip for a horse exceed 600 ft.

Two men are required on each motor, a motor man and a conductor. These haul the trip from the landing in the mine, out upon the trestle, and switch it on to the weighing and dumping track, returning with empties. The loaded cars are now uncoupled and pushed forward on the scales by a bankman. A tally-boy removes the tally and reads the miner's number to the weighman, returning the tally to its proper place on the tally-board. The miners have availed themselves of their legal right to appoint a checkweighman who overseers the weighing and checking of each box. After being weighed the cars are dumped by means of a Mitchell tipple capable of dumping 10 cars a minute. The tipple is so arranged that the following cars release the wheel-grips of the empty cars in front, which then runs down a 5 per cent. grade for a distance of 50 ft., and then switches automatically back on another track, falling 5 per cent. for the same distance, to the side of the tipple. From this point, reached by gravity, the car is pushed by a creeper up a 15 per cent. incline, to a sufficient height to permit it to run forward, under the action of gravity, on the empty track ready for attaching to the next return trip.

As the roof in both mines has been very sound, timbering has been a comparatively easy matter. The chief difficulties so far met with have arisen from slight faults and one slight fall in No. 2. But even these have been secured by the use of a few extra props with ties as cap-pieces. The props and booms are of tamarack and spruce, procured from the neighboring forests. They range from 7 to 10 inches in diameter. The timbers are set in the usual way, it being rather more than usually important to set the head of the props a little above a perpendicular from the foot of the prop to the roof, owing to the tendency to creep. This causes the prop to tighten in case of a creep, thus offering resistance instead of falling out.

Considerable quantities of firedamp are given off in both mines, due probably to the fact of the coal-beds being still almost intact and to their great thickness. Both mines show the natural tendency to become more fiery as the workings extend inward from the exposed outcrops, and as, in consequence, the depth of covering increases. The problem of ventilation is therefore of incrasing importance. Moreover, the altitude, 3,800 ft., gives very low barometric readings of 24 to 25 in., corresponding to a pressure of 12 to 12½ lbs. per square inch. This low pressure greatly increases the amount of firedamp given off from the coal. It also increases the volume of air required to dilute the firedamp and supply the men, in the ratio of 5:4. Besides, the reduced pressure augments the difficulty of exhaustion by fans. Thus, ventilation, as well as haulage and the tendency to creep, will require the closest attention of the engineer. The splitting system of ventilation is the one adopted, there being at present two splits in each mine. The air courses, splits, stoppings, etc. for No. 2 mine are shown in the plan, the direction of the air-current being shown by arrows. The

ventilation of No. 1 is similar to that of No. 2. This fan is of 8 ft. diameter by 4 ft. width, with 14 vanes. It is belted to an Atlas horizontal engine, the ratio of the engine and fan speed being 5:8. The fan speed at present is 208 revolutions, supplying 50,000 ft. of air to the mine per minute. It is capable of supplying 70,000 to 80,000 ft. per minute as occasion arises. The amount of air required by law is 100 cu. ft. per man per minute. The amount in circulation in each of these mines as shown by calculation from the velocity indicated by the anemometer, is more than 300 ft. per minute for every man, boy and horse.

The trestle is lighted by 16 pairs of incandescent lamps of 16-candle power. The main haulage roads are lighted by forty similar lamps of 20-candle power, one lamp being placed at each turn in the road and three at each landing. Arc lamps were tried at first, but these proved unsatisfactory, as they burned out quickly owing to coaldust. Naked lights are used in ali parts of the mines except those reported unsafe by the firemen.

Considering the extent of area developed below the drainage level, there is but little water. The irregular ground prevents concentration into one or more main sumps. To remove the water met with in the lower rooms of No. 2 mine, two Tripley electric pumps, one Gould hand pump, and one water car are in use. The capacity of the electric pumps is about 20 gal. per minute, each of the three plungers working at 60 strokes per minute. The small quantity of water met with in No. 1 is handled by one electric pump and one hand pump. Each of the electric pumps is driven by a 3-H. P. motor.

After being dumped by the Mitchell tipple as above described, the run-of-mine coal passes on to the screens. There are two mechanically-driven shaker screens, 20 ft. by 5 ft. with a working speed of 100 strokes per minute, the stroke being 6 in. Their inclination is 17°. The slack eliminated by the upper screen passes on to the under screen, which, as required, separates it into coking, and smithing or domestic coal. The screens are fitted with interchangeable, steel-wire bottoms of ¾ in. and 1½ in. mesh. The large coal is discharged by the upper screen upon a travelling picking-table, from which the sorters remove any pieces of bone, slate or stone that may have escaped the notice of the diggers. The picking table is 60 ft. long, 5 ft. wide, and travels 40 ft. per minute. The discharge of coal is regulated by means of friction gear attached to the driving shaft. The large coal and slack are discharged direct into cars standing on the sidings below. These cars are run down by gravity for filling and again for coupling into trainloads, the grade for that purpose being 2 per cent. All the slack goes to Fernie for manufacture into coke. The grade of the spur from Fernie to the mines is 2 per cent.; length, 5 miles.

All the slack from the Crow's Nest Pass Company's collieries is shipped to Fernie for manufacture into coke. The coke ovens are of beehive shape, 12 ft. in diameter and 7 ft. 3 in. high with open tops. When completed, there will be 500 of them, placed in two double rows, with three tracks. one on each side and one between. The coking coal is stored in a double-decked self-discharging bin. The bin has a capacity of 4,500 tons, cost $20,000, and required 750,000 ft. of lumber in its construction. The ovens are charged by a steam lorry having a capacity of 7 tons of slack. The lorry track, passng over the oven and under the bin is of standard gauge, 4 ft. 8½ in. The average charge of slack per oven is 6½ short tons; production of coke per charge, 4.42 tons; percentage of coke, 68; time of burning charge, 60 to 72 hours; average output per day, 1.4 tons. No provision is made at present to recover any of the by-products. The coke is cooled by watering inside the ovens. Coke thus cooled is said to be superior to that cooled outside the ovens, containing less moisture; though the process deteriorates the inside lining of the oven and causes considerable loss of heat.

THE COMPOSITION OF SOME CANADIAN LIMESTONES.*

By J. T. Donald.

The rapid development of industries in which lime or limestone is a raw material has given a new interest to this common mineral. The term limestone, however, as generally used includes any rock in which carbonate of lime is the predominant ingredient. This of course gives a wide range of composition. The ideal limestone is pure calcium carbonate containing 56 per cent. of lime and 44 per cent. of carbon dioxide. The condition under which beds of limestone have been deposited were such that it is scarcely possible to find them fully up to our ideal in degree of purity. Being a sedimentary rock, we usually find limestone containing more or less silicious matter, either as silica or as silicates. The amount of silicious matter may vary from a few tenths of 1 per cent. up to even 40 or 50 per cent.; in which latter case it is a question whether we should consider we have a sandy limestone or a calcareous sandstone.

But again, in nature we usually find that carbonate of lime is associated with carbonate of magnesia; indeed, it is scarcely possible to find a limestone that does not contain an appreciable percentage of magnesia; while on the other hand the magnesia may occur in such percentage that the stone becomes a magnesian limestone or dolomite, which normally contains: Lime, 30.40 per cent.; magnesia, 21.70 per cent.; carbon dioxide, 47.90 per cent. In addition to silica or silicates and magnesia, all limestones contain more or less of what someone has aptly called the "intruder into everything on earth," iron, in the form of iron oxide or iron sulphide.

The principal industries that call for limestone as one of their raw materials, are: 1. Calcium carbide. 2. Chemical wood pulp. 3. Portland cement. The object of this brief paper is to state in a general way the characters of the limestone required in each of these industries, illustrating by reference to Canadian limestones that have been analyzed by the writer.

1. Calcium Carbide.—A limestone to be suitable for the manufacture of this article should be as nearly as possible pure calcium carbonate. The presence of magnesia is particularly detrimental. A small percentage of silicious matter and a little iron oxide may be tolerated. These points are illustrated by the following analyses:

	No. 1.	No. 2.	No. 3.
Insoluble	.....	2.14	10.92
Carbonate of lime	96.89	52.00	87.71
Carbonate of magnesia	1.64	42.71	0.30
Iron oxide	.....	2.20	0.70

No. 1 is being used in a Canadian carbide works. Nos. 2 and 3 are unsuitable for carbide; No. 2 because of the magnesia it contains, and No. 3 on account of the high percentage of silicious matter.

2. Chemical Wood Pulp.—For soda pulp, pulp made by "cooking" the spruce or other wood in a solution of caustic soda—any ordinary good limestone will yield a lime suitable for causticizing the soda. But in the case of sulphite pulp it is otherwise; selected material is required. In this case the presence of magnesia is desirable, indeed the higher the percentage of magnesia, the more desirable is the stone. But iron is decidedly objectionable; its presence causes discoloration of the pulp. The following analyses are of Canadian limestones:

	No. 1.	No. 2.	No. 3.
Insoluble	2.10	2.14	0.14
Carbonate of lime	56.21	52.00	98.78
Carbonate of magnesia	41.20	42.71	Traces
Iron oxide	0.09	2.20	0.19

No. 1 is an excellent stone for sulphite pulp. No. 2, while good in other respects, contains too much iron. No. 3 does not contain sufficient magnesia.

3. Portland Cement.—This article is made by calcining a mixture containing proper proportions of silica, lime and alumina; this is usually a mixture of limestone and clay. A somewhat wide range of material is admissible in this industry. Magnesia is debarred to the extent that the finished cement must contain less than 3 per cent. of magnesia. A limestone comparatively high in silica is admissible, provided a clay or shale rich in alumina is obtainable.

A certain kind of impure limestone is the sole raw material for certain kinds of portland cement. This is commonly known as portland cement rock. It is really an argillaceous, or shaley or clayey limestone; that is, it is the materials for cement ready mixed by nature. The following ananlyses illustrate the statements just made:

	No. 1.	No. 2.	No. 3.
Insoluble matter	1.51	20.23	24.74
Carbonate of lime	97.21	50.37	41.80
Carbonate of magnesia	1.15	24.63	8.60
Iron oxide	0.17	2.81	6.30

No. 1 is an ordinary limestone suitable for cement. No. 2 contains too much magnesia. No. 3 is a natural cement rock.

*Paper presented at the Montreal meeting of the Canadian Mining Institute.

MINERAL INDUSTRY OF BRITISH COLUMBIA.

Written for the Engineering and Mining Journal by W. M. Brewer.

(Concluded from page 651, Canadian Supplement for May.)

Alberni.

This district includes all that portion of Vancouver Island locally known as the West Coast. Within its boundaries are situated the main mineral zones of the Island, in which occur bodies of ore, carrying gold, copper-gold and magnetic iron. During the past year most of the work done in this district has been confined to the vicinity of the Alberni Canal where development work has been prosecuted on the Three Jays, the property of the Nahmint Mining Company; the Monitor, the property of the Monitor Mining Company; the Golden Eagle, or Newton property, and on the deposits of iron ore located on Copper Island, Sarita River and Sechart, at the northwestern entrance of Barclay Sound. Prospecting and assessment work has been done on other parts of the West Coast, chiefly on mineral claims located in the mountains near the shores of Clayoquot Sound, Sydney Inlet and Quatsino Sound.

One of the most important features of the mineral industry of Vancouver Island was the yield of placer gold during 1900, from what is known as the Wreck Bay black sand deposits. At several places along the coast occur deposits of black sand which yield fine gold. Until the discoveries at Wreck Bay were made the saving of this gold had proven so difficult that but little importance was attached to these deposits.

However, during the season of 1900 about $12,000 were taken from the limited area on Wreck Bay. This incited prospectors to thoroughly explore the coast, which resulted in the discovery of other deposits of similar character, near the mouth of the Jordan River and at Claoose.

While there have not been any regular shippers of ore from the West Coast during the past year, yet it is expected that the Monitor Mine will begin shipping ore before the end of the year, and it is hoped continue as a regular shipper in future. The aerial tramway, bunkers and wharf on this property have recently been completed. The work on the Nahmint Company's property has been confined to development and blocking out ore in sight. It has been estimated by several engineers that there is at present nearly 100,000 tons of ore in sight in the mine. At the Golden Eagle work has been going on steadily for the past two or three years, on a cross-cut tunnel, which it is expected will intersect the ore body which outcrops on the property at a depth of about 1,000 ft. below the surface. The tunnel has already been run about 800 ft. There are on the West Coast of the Island a very large number of promising prospects, but the owners lack the necessary means to thoroughly develop, consequently most of the work performed in the past has been merely sufficient assessment work to hold the ground.

Victoria.

This district includes the south portion of Vancouver Island and within its boundaries are located the Lenora and Tyee on Mt. Sicker, as well as the Lubbe-Phair group on Mt. Skirt near Goldstream, 10 miles from Victoria.

The Lenora has been a regular shipper of copper-gold ore during the year, and the latter entered tne ranks of shippers late in the fall. The ores from these mines are very similar to the chalcopyrite ores of the

West Coast, and carry about 10 per cent. copper as well as low gold values. In the vicinity of Mt. Sicker quite a number of mineral claims have been located, some of which promise to develop into first-class prospects and possibly make mines. Most of the work of an exploratory nature performed in this district during the past year has been confined to Mt. Sicker and the neighboring mountains.

Vancouver Island and the West Coast of the mainland as well as Texada Island, possess the great advantage of ocean transportation. The mineral industry, though, is in its infancy, and while the possibilities appear very promising, yet the work of development has been so slow throughout this section and the difficulties attending exploration to any considerable distance from the coast lines are so great that progress is much retarded.

The enormous deposits of high-grade magnetite have only recently attracted much attention from capital. The fact that pig-iron and steel can be produced in this section of British Columbia, at almost as low a cost as in Alabama, has been overlooked entirely by the ironmasters of Europe and the United States, but apparently they are beginning to awaken, because during the past year considerable work has been done by a Pittsburg (Pennsylvania) syndicate on the various iron ore deposits with a view to determine their extent and grade.

In the New Westminster Mining Division, but few prospects possessing promise had been discovered until 1898. During that year the Howe

DISCOVERY OPEN-CUT, JANE CLAIM, BRITANNIA GROUP, B. C.

Sound belt of mineralized schist was prospected and the Britannia group of mineral claims located. Previous to this a few locations had been made in the vicinity of Pitt Lake, but as the work performed on them has been quite limited in extent they received but little attention. Probably no mineral zone in the province has attracted more universal attention during the past year than Howe Sound. The outcroppings of silicious copper-gold ores, the metals occurring in chalco and iron-pyrites, are exposed on the Jane and Fairview mineral claims of the Britannia Group, and the Daisy Claim of the Goldsmith Group are phenomenal with regard to their extent.

During the past year about 700 ft. of development work, besides stripping and shallow cross-cutting, have been performed on the Britannia Group. The satisfactory results which followed this work have been the cause of bringing a large number of experts from the States as well as from England to examine the occurrence of ore in the Howe Sound Camp. That the outcroppings are phenomenal is readily understood when it is considered that one bluff on the Jane Claim is over 600 ft. long, an average height of about 200 ft., and a possible width of about 200 ft. of silicious copper-gold ore. A tunnel run nearly at right angles to the line of strike into this bluff for a distance of 80 ft. is all in ore, with ore still in the breast, while following the face of the bluff from its western to its eastern extremity a large number of shots were put in at various heights above the level of the tunnel, all of which broke back to ore. On the Daisy Claim another enormous natural exposure occurs, which by shallow cross-cuts and strippings has been proven to be at least 100 ft. in thickness.

The Howe Sound mineral zone is unique in this respect. The belt of schist in which occur these enormous outcroppings is about 1 mile wide at the water's edge on the east shore of Howe Sound and wherever any work has been done within its boundaries from the water's edge to beyond the eastern line of the Jane Claim, this schist is found to be mineralized with iron pyrites, carrying variable but low gold values. Within this main belt occur the extensive bodies in which the values in gold and copper are of commercial importance. The gangue of these bodies is highly silicious. Their extent is at present problematical, because in no one place has there been sufficient work done to determine the tonnage. There is no question but that it is great.

The grade of the ore in the Howe Sound belt is low so far as the values are at present known, although on the Fairview Claim outcroppings of high-grade copper-gold ore occur, but these have not been developed sufficiently to warrant an opinion as to their values or extent when depth is attained.

BOUNTIES FOR LEAD SMELTING.

The petition of the British Columbia mine-owners had the effect desired, and the payment of bounties on lead smelted in Canada has been authorized, as shown in the following order from the Minister of Finance:

1. The Governor-in-Council may authorize the payment of the undermentioned bounties on lead refined in Canada from materials produced in Canadian smelters from Canadian lead ore: (a) on every ton of lead so refined during the calendar year 1902, $5; (b) on every ton of lead so refined during 1903, $4; (c) on every ton of lead so refined during 1904, $3; (d) on every ton of lead so refined during 1905, $2; (e) on every ton of lead so refined during 1906, $1.

2. The said bounties shall be payable half-yearly on the first days of July and January in each year.

3. The total sum payable for such bounties shall not exceed $100,000 in any year. If the sum payable at the rate per ton mentioned in resolution (1) on lead refined during the half of any calendar year shall exceed $50,000, then and in such cases the bounty payable per ton shall be reduced as regards that half year to such rate per ton as shall make the amount of bounties payable in respect of such half year not more than $50,000.

4. If the sum paid for such bounties in any half year shall be less than $50,000, the unpaid balance (being the difference between the sum so paid and $50,000) shall be carried to the credit of the bounty fund for the next succeeding half year, and may be paid out in such succeeding half year, in addition to the $50,000 hereinbefore provided.

5. The Governor-in-Council may make such rules and regulations (including regulations as to rates and charges for refining) as may be deemed expedient in the public interest for the carrying out of the purposes of this act, and all payments of bounty shall be subject to the due observance of such rules and regulations.

6. All bounties payable under these resolutions shall cease and determine on December 31st, 1906.

ABSTRACTS OF OFFICIAL REPORTS.

Dominion Coal Company, Nova Scotia.

At the recent annual meeting of this company the preliminary report for the year ending February 28th was presented. The report states that the sales of the company have increased during the past year to the extent of 200,000 tons. Owing to the very satisfactory demand which existed during the greater part of the year a larger amount could have been disposed of, but the delay in receiving machinery ordered for delivery in time to be of service during the busy season of last year, as well as the increased cost of supplies and the advance in wages, not only interfered with supplying the increased demand, but lessened the profits on the quantity shipped.

Operating expenses have been charged with a considerable amount for development work of but little benefit to the results of the past year, but the effect of which is now being felt in increased output and the lessened cost of transportation of the coal sold on delivered terms.

Mr. Donkin, the resident manager, having resigned after five years of faithful service, Mr. C. Shields has been appointed general manager, and has recently entered upon the duties of this position.

Ten thousand shares of preferred stock have been sold at $110 per share. Since the close of the fiscal year the sum of $95,743 has been deposited in the sinking fund. This, together with interest on $125,000 reserve sinking fund, is sufficient to retire $90,500 of the bonds of the company. Adding to this $6,500 bonds drawn last year, which had not been presented for payment at the close of the fiscal year, reduces the bonded indebtedness to $2,704,500.

The company's output during the past seven years, with an estimate for the present year, is as follows:

1895	884,500	1899	1,295,543
1896	1,169,785	1900	1,736,374
1897	1,221,471	1901	2,044,877
1898	1,061,669	1902	2,600,000

The treasurer's report shows the net proceeds from sale of coal and net income from steamships, barges, railroads, stores and real estate, deducting renewals and extensions at mines during the year, $687,294. After deducting interest on bonds, dividend on preferred stock, etc., the surplus of net income is shown to be $258,943. To this sum is to be added $100,000 premium on preferred stock. From this total the sum of $95,743 was placed in the sinking fund. The total assets of the company are placed at $22,705,718. The total surplus balance, according to the statement, amounts to $592,843.

PEAT BRIQUETTES IN RUSSIA.—It is reported that a large factory has been erected by the Russian Government near St. Petersburg, where a new patent is to be worked for the coking of peat on a large scale. Experiments have already given good results. The peat after treatment costs one-third the price of coal. The peat is being used on the railway between St. Petersburg and Moscow, and manufacturers from the interior of Russia have come to St. Petersburg at the invitation of the Minister of Finance in order to test the fuel.

PERSONAL.

Mr. A. Baring-Gould, a mining expert of Minneapolis, has been in Victoria, B. C.

Mr. A. Hill, mining engineer, of London, England, is visiting Mr. Kerr at Belmont Gold Mine, Ont.

Messrs. H. H. Hunter and J. L. Holland, of San Francisco, have been looking over mineral deposits on Vancouver Island.

Mr. Arthur F. Noel, superintendent of the Ben d'Or Mines, Lillooet, B. C., has been in Vancouver. He brought with him the clean-up for several weeks' run of the mill.

Prof. Eugene Haanel, who has been appointed Superintendent of Mines in Canada, in succession to Mr. William Pearce, is now in Ottawa.

Mr. James McEvoy, of the Canadian Geological Survey staff, who got out the last report on the Crow's Nest Pass coal-fields, has been engaged by the Crow's Nest Coal Company.

Dr. W. L. Goodwin, director of the School of Mining, Kingston, and Mr. M. B. Weekes, of the School of Practical Science, Toronto, were in Deloro, Ont., recently in connection with mining classes.

Mr. F. H. Andrews, of St. Stephen's, N. S., has been in St. John, N. B., on his way back from Pelly's Island, Newfoundland, where he owned a pyrites mine, which he has sold to American capitalists.

SOCIETIES AND TECHNICAL SCHOOLS.

Ontario Bureau of Mines.—The Bureau, recognizing the importance of putting elementary scientific knowledge within the reach of those living in the mineral regions, has announced that summer mining classes will be held at Deloro and Cordova, in the gold regions of Hastings; Cumbermere, in Renfrew; Copper Cliff, Bruce Mines; Rock Lake, Victoria Mine, Gertrude Mine, Helen Iron Mines. Sultana and Mikado Gold Mines, in New Ontario. The instructors will be Dr. W. L. Goodwin, director of the School of Mining, Kingston, and M. B. Weeks, fellow of assaying and metallurgy in the School of Practical Science, Toronto.

INDUSTRIAL NOTES.

The Dominion Iron and Steel Company, of Sydney, C. B., recently awarded a contract to Thayer & Company, of New York City, for a 5,000-H. P. Cahall boiler equipment, to be installed in the rolling mill of the Canadian plant. The boilers will be built by the Aultman & Taylor Machinery Company, of Mansfield, O.

At a meeting of the directors of the Cramp Ontario Steel Company in Toronto, C. D. Cramp, president, stated that the company is completing arrangements for letting a contract for the plant, and expects to start work soon. One result of the meeting was the decision to complete the purchase of 10,000 acres of coking coal in Wise County, West Virginia. Mr. Cramp said that the company has secured several iron properties in northern Ontario, on one of which there are 100,000 tons of bessemer iron ore in sight, and another area has a showing of iron extending over 300 by 1,200 ft. F. H. Clergue, of Sault Ste. Marie, considers that some of the conditions under which he associated himself with this company have not been fulfilled, and as a consequence his seat will be filled by a man practically associated with the iron and steel industry of the United States.

GENERAL MINING NEWS.

BRITISH COLUMBIA.

Atlin District.

Columbia Hydraulic Mining Company.—This company is getting in hydraulic machinery to work its ground on Spruce Creek above Discovery. A. A. Johnson is general manager.

Sunrise Company.—This company is now working a large force of men on its ground on Pine Creek. A large ditch is completed. A. Ruffner is manager.

Boundary District.

Granby Consolidated Mining Company.—The consolidation of the Granby Mines into this company was formally effected at Montreal on June 5th, when the following Directorate was elected: A. C. Miner, president; Jay P. Graves, vice-president and general manager; A. L. White, secretary; George W. Wooster, treasurer; A. C. Flumerfelt, assistant general manager. The following appointments were made: W. Y. Williams, superintendent of mine; A. B. W. Hodges, superintendent of smelter. The first meeting of the shareholders is to be held in August.

Montreal & Boston Copper Company.—This company has a nominal capital of $500,000 in 5,000 shares at $100 each. The head office is in Montreal, Que., and the head office in this Province at Greenwood. The company has been organized to acquire and work the Sunset Group in Deadwood Camp, heretofore owned by the Montreal Boundary Creek Mining Company, Limited, a Nova Scotia company, which will be wound up. The Sunset group includes the Sunset, Crown Silver and C. O. D. mineral claims, which adjoin the Mother Lode. Altogether 3,633 ft. of work has been done underground in development of the Sunset and Crown Silver, besides prospect holes and test pits on all 3 claims. The Sunset shaft was lately deepened to about 400 ft. Some 700 ft. of drifting and cross-cutting have been done at the 200-ft. level, and about 1,000 ft. at the 100-ft. level, from which also a winze has been sunk 60 ft. The Crown Silver shaft, started at a considerably higher elevation, is down 265 ft., with 190 ft. of cross-cutting and drifting at the 150-ft. level and 748 ft. at the 250-ft. level. Some ore of good grade was opened up in these workings. The equipment includes 2 80-H. P. horizontal return tubular boilers, half of a 20-drill duplex air compressor, 2 air receivers, 10 3¼ machine drills, an 80-H. P. hoisting engine, sinking and other mine pumps, Laurie feed water heater, safety platform cage, and a tool and repair shop. The Crown Silver has a 36 by 12 air receiver and a 6¼ by 8 hoisting engine, air being supplied by the Sunset compressor. About 30 men are now at work under Harry Johns, manager.

(From Our Special Correspondent.)

Boundary District Ore Shipments.—The ore shipments since the mines began shipping and for the week ending June 1st are:

	1900.	Week.	1901.	Totals.
Old Ironsides, Knob Hill and Victoria...	64,533	4,292	93,239	157,772
B. C. Mine.....	19,494	1,025	19,871	39,365
Golden Crown.....	2,500	.....	.....	2,500
Winnipeg	1,075	.....	.....	1,075
Athelstan	1,200	.....	550	1,750
Snowshoe	300	.....	150	450
Brooklyn	150	.....	.....	150
Totals, tons.....	89,252	5,317	113,810	203,062
Mother Lode.....	5,340	2,250	30,300	35,640
Other mines.....	3,180	.....	500	3,680
Totals, tons.....	97,772	7,567	144,610	242,382

British Columbia Copper Company.—Ore shipments from the Mother Lode Mine for May were 9,210 tons, making 28,230 tons for the 5 months of this year. Total shipments to end of May were 33,794 tons. The stopes at both 200 and 300-ft. levels are now in good-grade ore and from these and 2 of the surface openings the daily output ranges from 300 to 350 tons. The lately installed machinery and plant continues to run smoothly and matters about the mine have settled down to a steady producing basis.

B. C. Chartered Company.—From this Montreal company's B. C. Mine 5,035 tons of ore were sent to the smelter during May, making 20,579 tons for the current year. Adding last year's shipments, the aggregate output is 40,073 tons. The average copper values obtained run to nearly 7%, while silver was nearly 3 oz. to the ton, with small gold values. Development work continues and the diamond drill is kept at work prospecting both laterally and vertically.

Boundary District Smelters.—The Granby Company's Smelter during May treated 19,075 tons, with 2 furnaces running. The British Columbia Copper Company's Smelter treated in 1 furnace during May 11,830 tons, the average daily tonnage being 381 2/3 tons. Preparations are being pushed forward at the Granby Smelter toward increasing the capacity and it will have 3 months hence 4 furnaces and a copper converter in running order, and an ample supply of ore. The Standard Pyritic Smelting Company is making arrangements for a supply of ore, and when this is assured its smelter will be further equipped and started. The first gold quartz concentrates to be treated at the B. C. Copper Company's Smelter came from the Cariboo-McKinney Company's works at Camp McKinney in May and shipments are to be repeated at intervals.

Chicago & British Columbia Mining Compapny.—George W. Raithel, of Chicago, managing director of this company, has let a contract to R. P. Williams, agent of the Jencks Machine Company, for a complete development plant for his company's holdings. It will consist of a 60-H. P. boiler, 20-H. P. hoisting engine capable of hoisting from 500 ft., a No. 5 Cameron sinking pump and a 3¼-in. "Little Giant" drill. At the Lake Mine in Skylark Camp, about 3 miles from Phoenix, one of the group, on which exploration work has been in progress for some time, the main shaft is 4 by 8 ft. in the clear and is down 65 ft. The shaft will go to the 200-ft. level before any cross-cutting is done.

Jewel Gold Mines, Limited.—The English company owning the Jewel Group, Long Lake Camp, about 8 miles north of Greenwood, has resumed work after months of comparative idleness. The manager, Gilbert Mahon, went to England about 3 months since to confer with the directors and a fortnight ago the foreman received cabled instructions to begin a new shaft, in accordance with recommendations made by Dr. J. MacDonald, of the British America Corporation, who some time since reported on the property. The Jewel is the best developed and most promising gold quartz mine in the Boundary District. The development work on the group totals 2,410 ft., of which 749 is sinking and raising and 1,661 ft. cross-cutting and drifting. The present main shaft is down 348 ft. on the incline. At the 120-ft. level the drift extends 250 ft. north and 170 ft. south. At the 230-ft. level the north drift is in 740 ft. and the south 193 ft. The 330-ft. level is in 72 ft. north and 68 ft. south. A thorough sampling of the quartz by Mr. MacDonald gave an average of $13.36 per ton. The group includes the Jewel, Denero Grande, Gold Drop, Massachusetts and the Imperial and Exposition fractions.

Kettle River Placers.—Much excitement prevails at Grand Forks, whence numbers of men have gone up the North Fork of Kettle River some 40 to 50 miles to a place known as Franklin Camp, where some very promising lode claims were found last year. It is stated by a surveyor who knows the locality well that shot gold has been discovered in payable quantities in a gravel bench 100 ft. high which extends 2 or 3 miles.

No. 7 Mining Company.—This New York company is making good progress at its No. 7 Mine, near Greenwood. The main shaft has been enlarged and timbered to the old 130-ft. level, and a 20-ft. sump is being sunk below this level. The plant, put in during April and May, is now at work. Four machine drills are in use. The drifts at both the 60 and 130-ft. levels are being extended and stopes are being opened. A contract has been let for hauling ore to the railway and a side track is being put in about 4 miles from the mine, whence the ore will be taken by rail to the British Columbia Copper Company's smelter.

Sherbrooke Consolidated.—It is announced from Sherbrooke, Que., that a consolidation of the War Eagle, Red Rock and Lulu claims in Phoenix Camp has been made and the controling interest sold to a London, Eng., company, to be known as above, with a capital of £150,000, divided into £1 shares.

Snowshoe.—Development work on this mine at Phoenix in the long tunnel has shown 3 bodies of ore, one 95 ft., another 140 ft., and a third over 400 ft. long, and varying in width from 55 to 115 ft. The extent of these ore bodies was demonstrated by numerous cross-cuts. Lately a number of prospect surface cross-cuts have been run with a view of finding the apex of the largest ore body, and the management has found the vein to be 60 ft. wide on the outcrop. The point where the apex was found is 212 ft. above the present level of the Columbia & Western Railway track.

Cariboo District.

Messrs. Cockle, Johnson and Isaacs, on Stewart's Creek, are reported working in good ground, with 4 to 6 oz. per set, and on the same creek more than a mile above, Messrs. Petrie, Smith and one other own and are working drifting ground that is said to pay 4 to 6 oz. per set of timbers.

On Summit Creek, known as the scene of Messrs. Hamshaw & Young's operations for the past 2 or 3 years, the hydraulic is being operated by B. A. La Salle, taking 75% of the output, the balance going to the assignee for the defunct company, Peter Sutherland, of Barkersville.

Harry Jones is installing a Cornish pump at the Wing Dam on Lightning Creek, near Barkersville. Much money has been wasted on this property, the eastern management insisting on putting in an experimental pump.

Cariboo Gold Fields.—Machinery recently arrived and the bucket system will probably be installed in the old grounds below, and on Williams Creek.

Flynn.—Work is reported as going on in good shape at these mines on Mosquito Creek.

Cassiar District.

Bear Creek Mining Company.—This is a Seattle concern recently formed to work placer claims on Bear and Clear Creeks, about 75 miles above Skagway. The officials of the company, which is capitalized at $250,000, are H. H. Tripler, president; E. F. Wajan, of New York, vice-president; E. C. Crabe, secretary-treasurer. The property consists of 18 placer claims on the creeks mentioned, which were purchased from the men who located them last fall, Messrs. Lee and Cannon. A townsite of 1,500 acres has been purchased by Mrs. Hirchcock and Mr. Mankowski, two of the principal shareholders.

East Kootenay District.

Crow's Nest Pass.—Breckenridge & Lund, railway contractors, have 4 camps at points on the Crow's Nest Railway. The firm has completed a contract for the delivery of 500,000 ties to the Crow's Nest road, and has contracts for grading at the Loop, and is doing work at Michel and Fernie. It has just closed a contract for

grading 7 miles of roadbed between the coal mines at Morrisey and the Crow's Nest track. This work is for the Crow's Nest Southern.

Crow's Nest Coal Company.—Contracts have been awarded for the construction of 700 coke ovens, 300 of which will be built at Michel.

Estella & Rover.—The tunnel on these claims is now in between 600 and 700 ft.; at 260 ft. a crosscut was driven which shows 12 ft. of ore. Stoping has started on the Estella Tunnel and there is about 100 tons of ore on the dump.

North Star.—This mine at Kimberley is shipping sufficient ore to fill its contract with the Canadian Pacific Railroad, while the Sullivan is shut up tight, the only man about the place being the caretaker.

St. Eugene.—Work has fully resumed in this mine at Moyie, as also at the concentrator. From present indications there will be no further shutdown this year. About 150 men are employed, and it is said that the force will be further increased.

Tit for Tat.—This group is reported bonded for a large sum. This is a free gold property. Development will begin at once and machinery added as required.

Wild Horse Creek Placers.—At present, it is said, about 75 men are at work at various places along this historic placer ground. C. H. Pollen has a force of men at work on leased ground near the mouth of Boulder Creek. The Chinese Company, which has leased the upper portion of the Invicta ground, is doing good work and has a large force working full time. On the other side of the creek, on the Nip & Tuck ground, large quantities of gravel are being moved, with every indication of a good clean-up. Several Chinese companies are meanwhile at work in the bed of Wild Horse Creek, and making good pay.

Lillooet District.

Anderson Lake Mining Company.—At the annual meeting in Lillooet on May 17th over 700,000 shares were represented. The condition of the company's affairs were found satisfactory. New ore feeders and new shoes and dies have been put in and a new boarding house built. The ditch has been covered over to prevent trouble from slides. The April mill run for 21 days, working 2/3 capacity, gave a return of about $1,650. The grade of gold is fair, 101 oz. of retorted gold yielding about $1,650 by the Seattle assay returns. Besides the gold 170 oz. of specimens in quartz were saved. It is the intention of the company to put in 10 more stamps, for which the mill is built. A new board of directors was elected consisting or Messrs. Marshall, Sanson, Reynolds, W. E. and A. A. Brett. Dr. George Sanson was elected president, and R. A. Fraser, secretary of the company. W. E. Brett was, by the board, appointed manager.

Ben d'Or.—These mines, situated on Cadwallader Creek, about 70 miles from Lillooet, are reported bonded to a New York syndicate and the first payment of $125,000 is to be made on June 25th. It is said that a 10-stamp mill is in operation. Active development work will be started at once by the New York people.

Tumbo Island.

Chicago National Mines Development Company.—This Chicago company has, it is said, acquired this coal property on the ship channel between Victoria and Vancouver. The property is stated to be underlaid with a 13-ft. seam of good coal and a plant will be installed.

Vancouver Island.

Col. Hay's mine on the Alberni Canal, on this island, is reported bonded by Mackenzie & Mann for $600,000, the first payment, $100,000, to be made on July 15th. It is said that the bond will certainly be taken up by Mackenzie & Mann, who have associated with them Montreal men. They will erect a smelter and tramway.

Mount Sicker and Brenton Mines, Limited.—This company has been incorporated. The company is capitalized at $1,000,000, in 4,000,000 shares of 25c. The claims owned are situated on Mounts Sicker and Brenton, 12 miles from the harbor of Chemainus. They consist of the Susan, Copper Canyon, Victoria and 2 fractions, the Yankee, the Anoka, the May and the Star. It is claimed by the promoters that the ledges of the Lenora Mine traverse the claims of the Copper Canyon Group. Crosscuts and tunnels are stated to have shown that the Lenora lodes can be tapped at 900 ft. below the lower level of the present Lenora workings. The properties are accessible by wagon road from Duncan and Westholme, and from the latter point by the Mount Sicker Railway. The average value of the ore per ton is estimated at, copper, $14.50; gold-silver, $5.50—total, $20. The cost of mining, shipping and smelting is estimated at $11.75 per ton, leaving a possible profit of $8.25 per ton. The officers of the compapnyp are: William A. Dier, Victoria, managing director; Peter J. Pearson, Chemainus, superintendent; Pellew-Harvey, Bryant and Gilman, consulting engineers; Lewis G. Hill, Chemainus, secretary-treasurer. Bankers—Bank of British North America. The Board of Directors consist of W. A. Dier, formerly managing director and vice-president of the Winchester Gold Mines; A. St. G. Hamersley, Vancouver; E. E. Smith, Syracuse, N. Y.; Elmore D. Dier, Victoria; F. D. Conway, Chemainus, H. M. Customs and Peter J. Pearson, Chemainus. Considerable development has been done on the property, and this is being continued. At the Mount Brenton mines an office, warehouses, etc., are being erected.

Key West.—Preliminary work on this Mt. Sicker property is reported nearly completed. A tunnel is to be driven from the line of the Key West to the line of the Tyhee, which will be 1,500 ft. long. A compressor is in place. A. Wasson is manager.

West Kootenay District.

Rossland Ore Shipments.—Shipments for the week ending June 8th and for the year to that date are:

	Week. Tons.	Year. Tons.
Le Roi	2,100	94,808
Center Star	1,770	46,218
War Eagle	900	16,950
Le Roi No. 2	595	17,680
Rossland G. W	...	7,281
Iron Mask	40	2,092
I. X. L	...	164
Velvet	...	563
Evening Star	...	74
Spitzee	20	80
Giant	...	52
Portland	...	24
Totals	5,425	185,987

The falling off the last week is due to a partial suspension of shipments at several of the big mines. At the Le Roi the traction rope on the tramway was being replaced.

Slocan Lake Shipments.—Shipments of ore from Slocan Lake for 1899 were 3,940 tons. Shipments in 1900 totaled 4,930 tons. The shipmpents up to June 8th from January 1st, 1901, were: From New Denver: Hartney, 140 tons; from Bosun Landing; Bosun, 280; from Silverton: Alpha, 40; Hewett, 570; Emily Edith, 40; from Enterprise Landing: Enterprise, 200; from Twenty-Mile Landing: V. & M., 20; from Slocan City: Arlington, 1,585; Two Friends, 40; Black Prince, 100; Bondholder, 50; Chapleau, 15; Speculator, 20; Phoenix, 20; total, 3,100.

Alice.—At this mine near Creston the vein has been cut at 250 ft. level and proves to be the same as the 100-ft. level, the vein being about 3 ft. wide. The ore is silver-lead. The property is managed by T. G. Proctor, of Nelson.

Bennison.—This group of claims, on the western slope of the Duncan on the boundary between East and West Kootenay, will be developed this season by the Kootenay Consolidated Company. Major Clohecy is manager.

California.—This property adjoining the Le Roi at Rossland is to be worked. It is controlled by an Eastern syndicate.

Cascade.—Men are at work sinking the old shaft, which is now down 50 ft. This shaft will ultimately connect with the tunnel at a depth of 100 ft.

Chicago National Mines Development Company.—This Chicago company has purchased a controlling interest in the Carthage Group of gold claims near the Ymir Mines, Limited. Active development will, it is said, begin at once.

Congo.—This group on Red Mountain, in Slocan Division, is to be developed by the owners. Lack of transportation has retarded the development of this and other properties in the neighborhood.

Duquesne Mining Company.—A party of Pittsburg, Pa., men organized this company a short time ago under the laws of Delaware. The company is composed of W. C. Connelly, who is president; R. M. Mackenzie, treasurer; Capt. D. Paul Hughes, secretary, and a board of directors consisting of F. H. Guffey, Dr. M. W. Marrata, Dr. J. L. Wessels, Dr. C. E. Wade, A .T. Stewart and C. B. Perree, and Ralph C. Lupton. The claim is located in the Big Bend District, about 70 miles from the town of Revelstoke, on the Canadian Pacific Railroad. It is on Smith Creek, and at one time was worked as a shallow placer mine, but had been abandoned. Captain Hughes was sent to investigate. He made a favorable report and the company will equip the claim with a good plant.

Eva.—This claim on Fish Creek, Lardeau Division, owned by a close Nelson corporation. It is opened 200 ft. deep. It was first bonded by a French syndicate for $75,000, which threw up the bond after failing to strike the lead at a lower level than that already run. The claims are situated about 8 miles from Comaplix.

Evening Star.—After 2 years' idleness, this group, on Dayton Creek, near Sandon, has resumed work. The group is owned by Hugh Sutherland and was once a large prpoducer, but when the labor troubles came on 2 years ago it closed down and has remained idle ever since. The present operations will be confined to surface work, in tracing the lead down the hill.

Giant.—The purchase of this Rossland Mine by C. H. McIntosh is said to have been on a basis of about $175,000, and stockholders in the old company will get shares in the new concern at a rate under 7c. Governor Mackintosh, it is said, will form a London company to be known as the Giant Mining Company, Limited, with a capital of £200,000. A working capital of $200,000 will be placed in the treasury, half of which will be available for the development of the Giant and the balance for the development of other properties that may be acquired.

Hewett Mining Company.—This company has acquired the interests held by A. S. Reed, in the Rincon and Rincon Fraction mineral claims near Silverton, thus giving it title to the whole of the property. The 2 claims adjoin the Hewett Claim and the company now owns over 4,000 ft. of the Hewett vein. This big dry ore proposition has shipped this year some 570 tons of silver ore. A large amount is sacked and ready for shipment and large bodies of ore are reported blocked out, while a force of men is developing and blocking out still more ore. Recently an 800-ft. tunnel contract was let, and work has begun upon it. An aerial tramway is also erected.

Highlander.—The long tunnel driven on this mine at Ainsworth has encountered the lead at a depth of 900 ft. The vein is claimed to be high grade galena ore and more than 27 ft. wide. The values contained are not reported.

International.—This group is in Burnt Basin, not far from Rossland. A crew of men is engaged in driving the tunnel.

Ivanhoe.—This mine near Sandon has closed down.

Last Chance.—All the men working on ore at this Sandon mine have been laid off. The stopes were found too wet and no ore will be taken out until the seepage subsides. Work on the Galena Tunnel will be continued with a force of 15 men. This tunnel is now in 1,300 ft. and it is calculated to tap the Galena vein at 1,800 ft., giving a depth of 900 ft. on the vein. The tunnel is 7 by 9 in the clear. Air power from the Noble Five plant is used and at the present rate of progress the ledge will be reached within 100 days. John O. Regan is supeprintendent.

Lator.—A complete hoisting outfit has been ordered by the management of this Slocan Mine. A blower was recently received for furnishing air in the No. 2 workings. The hoist is for the No. 1 workings, where the shaft is to be sunk several hundred feet. Work at present is confined principally to the No. 2 drift, which is in over 600 ft. Over 90 men are busy.

Le Roi.—The shaft is down 1,100 ft., and sinking will be continued to the 1,200-ft. level.

Lone Star.—This group on Nettie L. Hill near Ferguson has just been sold to Toledo, O., men, who will drive a 250-ft. tunnel. The property consists of 3 claims.

Maybe.—Work has been resumed on the claim near Ferguson on a 200-ft. tunnel.

Minnesota Mining and Development Company.—This company has purchased the Nellie Group on Lexington Creek in Lardeau Mining Division and will begin active development work.

New St. Elmo.—The south drift is in 482 ft. from the south crosscut following the vein. The crosscut from the north drift is in 35 ft.

Noble Five Mining and Milling Company.—This Sandon company has begun developing the Last Chance ledge, a contract having been let recently for 320 ft. of tunnelling, which will be a continuation of the A tunnel. There are 2 shifts working, employing 7 men.

No. 1.—Development work on the 400, 600 and 840-ft. levels of this Rossland mine is prosecuted as usual, the mine furnishing about its usual contribution to the output of the Le Roi No. 2. In the Josie the shaft is down 730 ft., and a station is to be cut on the 700-ft. level, from which drifts will be started.

Old Glory.—This property is to be opened up by J. W. Westfall, of Trout Lake. Development work will be continued on adjoining properties which are owned by the same company. The Primrose, one of the Old Gold groups, on which a new find was made last fall, will be thoroughly prospected.

Payne Mining Company.—The preliminary surveys for the compressor have been made by H. E. Twigg, of New Denver, Superintendent Garde, states that if sufficient water power can be developed on the site chosen, a 12-drill compressor will be built. Tests are being made of the dumps and the waste in the mine, and if these tests justify the construction of a mill, work will begin.

Pingree.—Messrs. A. G. Shaw and John McRae are developing this group on Forty-nine Creek above the May & Jennie properpty, in Nelson District. One tunnel has been run on the ledge for 35 ft. and a crosscut is in some 45 ft.

Richelieu Consolidated.—At this mine near Crawford Bay a tramway will be constructed during the summer connecting the mine with the end of the wagon road. This tramway will be something over 8,000 ft. long and will enable the company to ship the year around.

Rockland.—The Miner-Graves Syndicate is to resume work on this claim near Silverton.

Rossland Bonanza.—A station has been cut out in the tunnel at a point 150 ft. from the portal and a winze begun to go down 100 ft. in the center of the No. 1 ore chute. The paystreak here is 2½ ft. wide and is said to average a little over $35 in gold and silver.

Rossland-Great Western.—The development of the deep levels is progressing. From the 800-ft. level the drifts are advancing with good showings.

Second Relief.—Work has begun on the construction of a plant of the same character as that at the Ymir Mine on the north fork of the Salmon River. Finch & Campbell, the owners of this property, have, it is said, spent $100,000 on the development of the mine, which is now in a condition to make a considerable output. The vein has been opened by 3 main tunnels, the lower of which is in over 1,000 ft. The machinery for the mine is on the road. It includes a battery of 10 stamps, a Huntington mill, Wilfley tables, Frue vanners and a compressor plant. About 60 men will be employed on the construction, and it is hoped that the mill will be in working order in less than 3 months. In 1899 a wagon road was built from the mine to the town of Erie. This road is 12 miles long and cost over $9,000. Up to date about 500 tons of crude ore have been hauled from the mine and shipped to the Northport smelter.

Spitzee.—The drifts to be started from the 100-ft. level of the mine will explore the ore body at this level.

Silver Cup.—A big strike is reported in this mine at Ferguson, the ore containing silver and gold values.

Triune.—Arrangements are in progress for beginning work again on this mine near Ferguson. The Ferguson Brothers intend to work a large crew, and as soon as the first shipment reaches the smelter an aerial tramway will be installed. At present the ore has to be packed on horses down the hill and from there hauled to Thompson's Landing on freight wagons. A long base tunnel will be driven and a systematic course of development pursued.

Whitewater.—This mine in Slocan Division has closed down with no immediate prospects of reopening. The reason given is that there is no market for the ore.

West Kootenay Power and Light Company.—This company is making good progress with the additions to its plant at Bonnington Falls. At present 90 men are emplpoyed on rock work and material is being removed for the new hydraulic canal at a rapid rate.

Ymir Mines.—During April these mines at Ymir ran 80 stamps for 28½ days. The estimated net profit on operating is $24,800. This return is up to the average.

Yale District.

Florence.—Two miles and a half above Hedley City, at an elevation of 4,500 ft. above Twenty-Mile Creek, Thomas Bradshaw and George H. Collins are working a force of men on this group. The claims are the Florence, Little Pittsburg, Whale and Bullion Beck situated in the immediate vicinity of the Nickel Plate Group. A tunnel is being driven on the Florence.

NEW BRUNSWICK.

Intercolonial.—This copper mine at Dorchester is installing a battery of roasters, built at the Phoenix foundry, St. John, under the Carmichael patents. The roasters are 15 in number and are said to have a capacity of 12 to 15 tons each every 24 hours. The principal officers of the company reside in Rhode Island.

Kent County.

It is reported that a 3½-ft. seam of coal has been struck by the men at work at G. R. Jones' coal mine at Harcourt. The mine has recently been bonded by Mr. Jones for $25,000 to Americans.

Canadian Coal and Manganese Company.—This company recently organized with a capital stock of $1,000,000, proposes to acquire and operate coal mines at Mount Carlyle, at Coal Branch. The applicants for incorporation are James P. Geddes, New York; Charles G. Polleys, N. J.; Gurney R. Jones, Alexander Gibson, Joseph H. Rogers, and E .Albert Reilly, of Moncton. Two good seams of coal are said to be opened and it is the intention of the company to put in a first-class mining plant.

Westmoreland County.

Petroleum Discovery.—A discovery of crude petroleum is reported at St. Joseph's, near Memramcook. The New Brunswick Petroleum Company has been exploring in this vicinity for some time. The first well sunk was at Dover, 7 miles from Moncton. The well was sunk 1,400 ft. and found oil-bearing sands but no oil. The second well was started near St. Joseph's College last fall and was sunk 1,100 ft. An oil-bearing sand was struck at 365 ft., but not investigated. A third well was started in May at a point on the college farm near Lawrence Memorial Hall. It struck an oil sand at 300 ft. and found some oil. Prof. Shaler, of Harvard University, and Prof. Goodrich, of Boston, according to a local paper, both reported on the chances of obtaining oil in 1899. The oil from the present well is a dark brownish green and has a specific gravity of .860. The oil is being analyzed in New York. The company intends to continue exploration.

NOVA SCOTIA.

Cape Breton.

Chimney Corner.—This coal mine, situated on the Gulf side of Cape Breton, near Messrs. Mackenzie & Mann's property, is reported sold to English men. It comprises several miles of areas, and is mostly owned by Halifax parties. The shipping is to be from Margaree.

Dominion Coal Company.—At the annual meeting in Montreal it was announced that James Ross, vice-president of the Montreal Street Railway would take over the active management of the company. The following directors were elected: R. B. Angus, H. F. Dimock, L. J. Forget, D. Mackeen, J. S. McLennan, F. F. Pearson, James Ross, W. B. Ross, Lord Strathcona, Sir William C. Van Horne and H. M. Whitney. At a subsequent meeting Mr. Whitney was re-elected president.

According to James Ross, vice-president, the company this year will mine 2,600,000 tons of coal. At present 5,000 tons daily are shipped to Montreal and other St. Lawrence River points, while 600,000 tons will be sent to Everett, Mass., this year.

Mabou.—Mr. Lionaise, of Quebec, has bought the Mabou and Burchell coal mines, and resold them to the E. M. Upton Coal Company, of Rochester, N. Y., which expects to have 3 miles of railway connecting the Mabou property with Mabou harbor, for shipping purposes, in operation by September 1st, and to be shippipng a little later about 1,000 tons per day. The Burchell property is 12 miles from North Sydney, and it is expected to have an output from this mine of 300 tons a day by September.

Port Hood Mining Company.—The president, G. E. Faulkner, and the directors were in Sydney recently. The mines have a daily output of about 300 tons and there are nearly 12,000 tons of coal banked. The company is not prepared to ship by steamer and during this summer shipping will be by schooners. The opening of the Inverness & Richmond Railroad will enable the company to make shipments during the winter.

Sydney Coal Company.—Representatives of this company, who hold the old Greener Mine and other areas, have been in Sydney. President S. E. Bennett, of Boston, and the secretary, Joseph Grant, also of that city, looked over the property and arranged for improvements. They will prpobably sink another shaft in the direction of Little Bras d'Or.

Inverness County.

A deposit of specular iron ore is reported discovered by parties in North Sydney in this county.

ONTARIO.

Lake of the Woods District.

(From Our Special Correspondent.)

Near Ross Rapids on the northeastern shore of Sturgeon Lake some Detroit men are having some development done under Chas. Brent. A shaft is down 20 ft. and 2 other shafts, each of 25 ft., will be sunk. If the indications are favorable at the first shaft sinking will be continued. All the work is being done by contract at $25 a foot. The vein is quartz, lies between trap and the granite, and is said to show good values in gold, although at present depth it is under 24 in. wide.

Boulder.—The main shaft will be sunk 300 ft. deeper and some 400 ft. of cross-cutting done. Seven drills are now at work. Chas. E. Van Barnevelt, of St. Paul, Minn., is consulting engineer.

Gordon.—A shaft is to be sunk 50 ft. and the property prospected. It is near the Champion and claims to have the Champion vein.

Golden Eagle.—Manager Higbee recently went out with a gang to make a small mill test of the ore at the mill on the Gatensbury property near by. Drifting continues.

Golden Hawk.—A crew is prospecting, cross-cutting, etc., on this and other adjoining claims in the Manitoba Boundary District. Some of the veins are said to be wide and assay well.

Golden Horn.—Capt. Ed. Hammel has taken a party of 5 out to this property on Rust Bay to begin a new shaft. There is now a 75-ft. shaft and some drifting. The new shaft will be vertical.

Gold Panner.—The shaft has been unwatered for inspection by some New York men.

Homestake.—Capt. H. Proudlock is in charge. A hoisting plant and pump are being installed.

Mikado.—The mill has shut down until a certain amount of development has been done. At the recent annual meeting of the company in London the superintendent recommended that the inclined shaft be sunk and the drifts at the 8th level extended.

Regina.—Preparations are made for resuming work, but only preliminary operations can be reported. The name is changed to the Black Eagle Mining Company.

Sakoose.—The spur track is repaired, and shipments to the Keewatin Reduction Works resumed. The mine employs over 70 men.

Sultana.—A lens of quartz has been located with the diamond drill. One bore hole disclosed a thickness of 22 ft. This was on what is called the main vein.

Rainy Lake District.

Rich mica deposits are reported on the Canadian Northern Railway, 140 miles west of Port Arthur. A block 6 ft. cubed is to be sent to the Pan-American Exhibition.

Larson Reef.—The machinery for this mine, near Dryden, consisting of air compressor, engine and drills, which was ordered from Sherbrooke, Que., some time ago, arrived at Dryden recently and is being rapidly put in position. Work will soon be resumed with a full staff of from 20 to 25 men.

Sudbury District.

Bruce Copper Mines.—On June 12th the main shaft building at the Bruce mines was destroyed by fire. The loss is upward of $35,000, insurance $20,000. The Bruce Mines were from 1846 to 1876 very famous as a copper producer. The plant destroyed was just erected and a good example of modern mining equipment. The boilers, warehouse and other buildings adjacent were saved. The company recently completed a large concentrating mill, which started on May 1st, and shipments of copper concentrates had started, 250 tons of ore per day being treated. About 250 men were employed, a number of whom will be thrown out of work temporarily. The plant will be immediately reconstructed. The origin of the fire is unknown. No lives were lost.

Mond Nickel Company.—This company has been organized in England with a capital of £600,000. The president is Mr. Ludwig Mond, of London, and among the directors are James Ross and George A. Drummond, both of Montreal. The company's capital is divided into 50,000 cumulative 7% preference shares of £5 each, and 300,000 ordinary and 50,000 deferred shares of £1 each. The company will carry on the business of mining and smelting nickel and copper ores, and of refining them, by the patent process of Dr. Ludwig Mond. The company will acquire from Dr. Mond the business carried on by him, with the existing patents, and properties, including mines. The company has also a freehold property at Clydach, near Swansea, Wales, where works are being erected, and a small plant at Smethwick, near Birmingham. Under the process in operation at these works, sulphate of copper is produced as a by-product. The purchase price is £325,000, payable £99,165 in ordinary shares, £50,000 in deferred shares, and the balance in cash, leaving £115,000 working capital. The Canadian nickel properties held by Dr. Mond were acquired by purchase from Rinaldo McConnell, of Ottawa, and are mostly in the township of Denison. They have been under development by Dr. Mond for the past two years. He has had 2 diamond drills at work much of this time, and has been sinking a shaft and erecting smelting works.

MINING STOCKS.

(Full quotations of the Toronto and Montreal Exchanges will be found on page 801.)

Montreal. June 15

(From Our Special Correspondent.)

For a short time only was trading brisk; and then sales were largest in the cheaper priced mining shares. To-day the market is again lethargic.

The unfortunate and somewhat unsavory dissolution in London of corporations interested in British Columbia has reflected rather unfavorably on our mining industry. Yet there are many who believe that the breaking up of these heavily over-capitalized stock jobbing concerns will ultimately benefit our mineral industry.

Of the shares traded in on the local exchanges Center Star fluctuated between 50@39½c., and North Star, upon declaration of its second quarterly dividend this year, amounting to $39,000, gained to 65c. Payne, in stopping work, dropped in price to 25c., though sales were reported around 33c. only a short time before. Republic, of Washington, showed large trading at the decline from 14c. to 9c. Crow's Nest Coal shares were not sold, although quotations were $85@$72.

In the open market industrials were subscribed for satisfactorily, especially the shares of the American combination of manufacturers of heavy engines, mining and other machinery. The Allis-Chalmers Company offered $8,400,000 7% cumulative preferred stock at 105%, of which 50% was paid May 24th and 50% is due July 1st. Our people think rather favorably of this company, since it includes such prominent and reliable firms.

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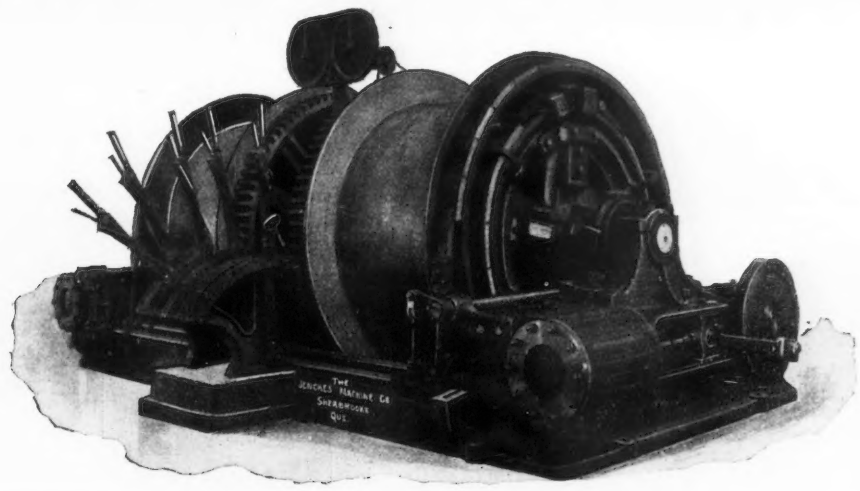

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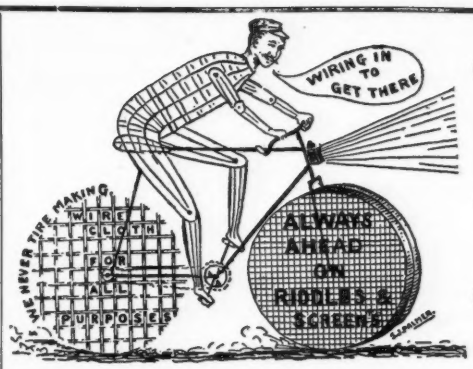

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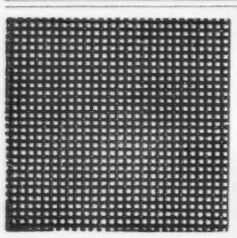

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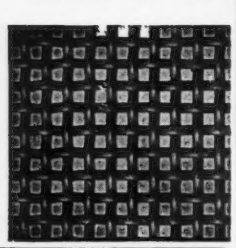

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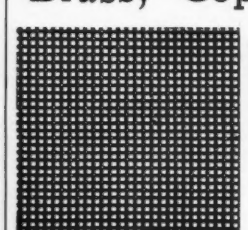

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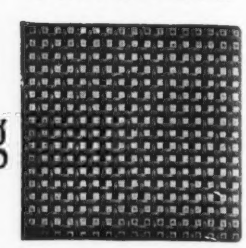

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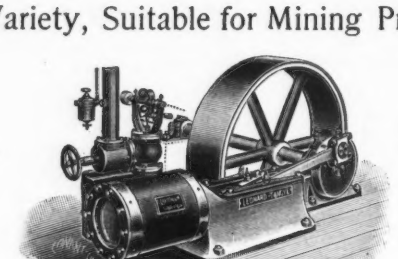

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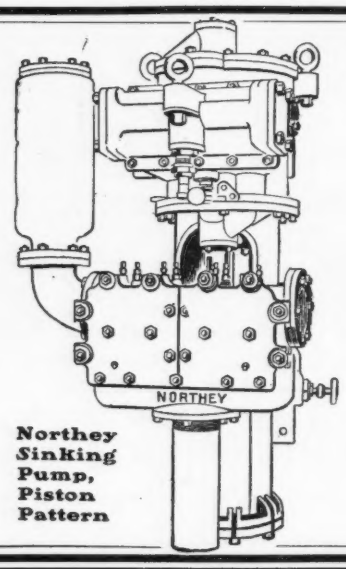

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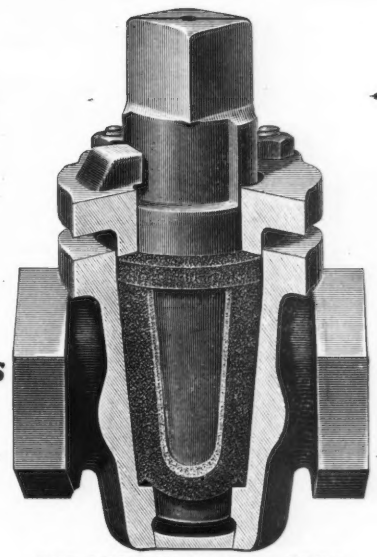

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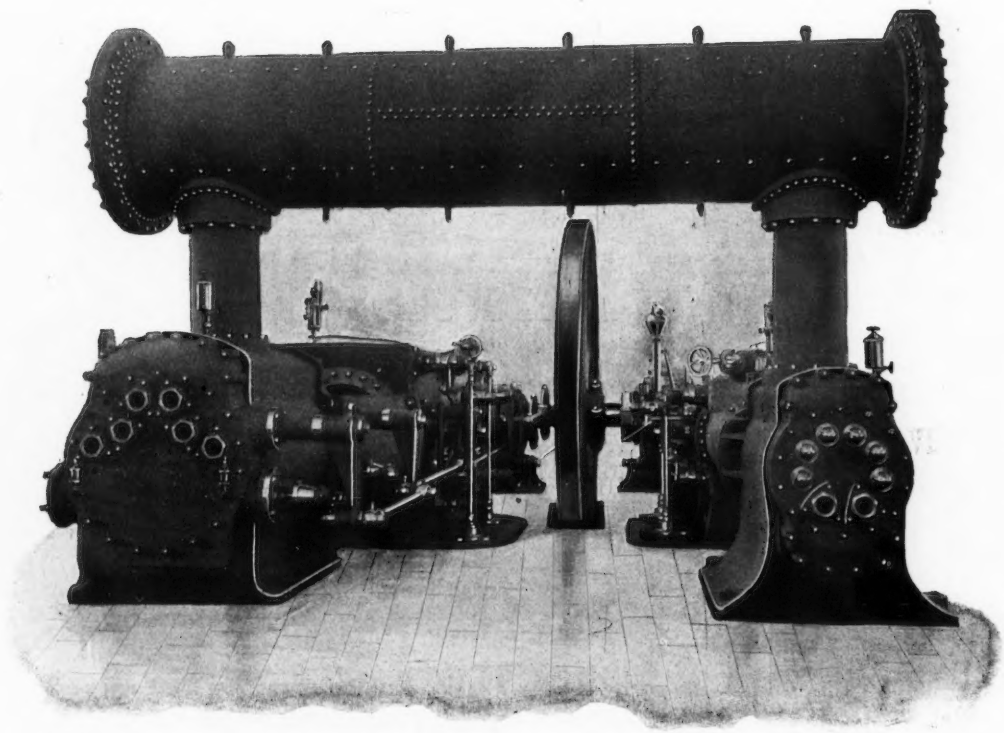

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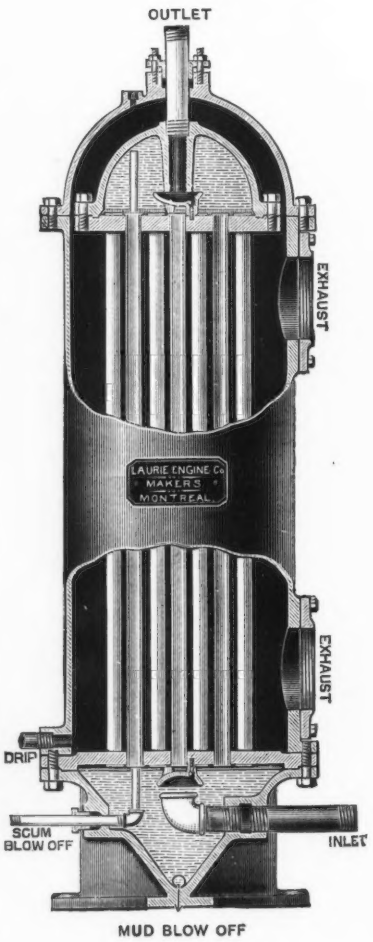

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